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A TREATISE ON *SURGICAL ANATOMY.*

PART THE FIRST.

By ABRAHAM COLLES,

ONE OF THE PROFESSORS OF ANATOMY AND SURGERY IN THE
ROYAL COLLEGE OF SURGEONS IN IRELAND,
&c. &c. &c.

DUBLIN:
Printed by N. Kelly,

FOR GILBERT AND HODGES,
27, DAME-STREET.

1811.

TO THE

PRESIDENT,

MEMBERS, AND LICENTIATES

OF THE

ROYAL COLLEGE OF SURGEONS

IN IRELAND,

This Treatise is respectfully dedicated,

By their obedient
Humble Servant,
A. COLLES.

PREFACE.

THE Author of the following work had observed with regret, the slow progress, which, even the most assiduous of the Pupils of the College of Surgeons, generally made in the acquirement of anatomical knowledge. A close consideration of the matter led him to apprehend, that this originated from some material defects in the established mode of teaching this Science. What these defects are, he has endeavoured to explain in the Address prefixed to this work. Further reflection convinced him, that most of the obstacles which retarded the progress of the Student might be removed, by devising a plan of instruction, which should point out at each step, the practical application of anatomical researches to surgical uses. And the rapid advances in useful knowlege, made by the Pupils, since the adoption of such a plan, have served to confirm his opinion of its utility.

PREFACE.

The following work was undertaken with the view of giving additional efficacy to an experiment, in the success of which, the Author feels himself so deeply interested. It was hoped, that such a publication would enable the Student to examine, for himself, the anatomical structure of the parts, by pointing out to him, the best plan of proceeding in the Dissection; and that it would also serve to imprint on his memory, when he retires to his closet, what he had seen and learned in the Dissecting-room.

It is by no means intended to offer here, a full system of what the Author has termed Surgical Anatomy. The Anatomy of some parts is altogether omitted—in treating of others, he has pointed out only some few of their many practical applications. In fact, the present Essay is nothing more than a rough and imperfect sketch; but should the plan be approved of, it will not be a difficult matter to extend it hereafter into a complete system.

The plans for making the Dissections have been laid down in such a manner, as will enable the Student to enjoy, from the dissection of each part on a single subject, a connected and comprehensive view of the structure: so that he may have it in his power to form an accurate idea of the various relations which the structure of this part bears to the phænomena of its diseases, and the modes of operation recommended for their removal.

The publication has been unavoidably delayed to this late period of the season, in consequence of the extraordinary share of public duty, which unexpectedly devolved upon the author. This circumstance, it is hoped, will also serve as some apology for the many inaccuracies of composition to be met with in the work.

Stephen's-green,
April 2d, 1811.

AN ADDRESS TO THE PUPILS OF THE ROYAL COLLEGE OF SURGEONS IN IRELAND,

On the preparatory Education necessary for the Surgical Student.

IT requires but little argument to prove, that to form a good Surgeon, a good education is the first and most essential requisite. For nothing contributes more effectually either to expand the understanding, or to mature the judgment, than an early exercise of the intellectual faculties. It enables the Student to take more clear and comprehensive views of the facts which occur to his observation; it teaches him to deduce from those facts, none but logical inferences, and secures his reason from the danger of being hurried away by the speciousness of false analogies. But so extended is the circle of human sciences, and so short the time allotted to preparatory studies, that (even with the most strenuous and best directed exertions,) the sum of general information which can be acquired in the earliest years of life, must necessarily be very limited; it is therefore of importance, that the earlier studies of those who may be intended for any profession, be directed to such subjects as will be most subservient to their future pursuits. And it is incumbent on the Student, in whose case this early attention has been omitted, to remedy the defect with all the diligence he can exercise. Now, as some Sciences are very closely connected with that of Surgery, while others bear no manner of relation to it whatever, I think it my duty to prevent as far as in me lies, any waste of time, or misapplication of talent in the outset of your professional career, by pointing out to you the several sciences which appear to me materially connected with the study of Surgery, by explaining their respective importance, by shewing how far each may be useful, and marking the line where it ceases to be so.

On the necessity of Classical information, it is needless to dwell, because, in fact, no person can be admitted a registered Pupil of the College of Surgeons, until he has undergone a public examination in Greek and Latin, before the Court of Examiners; but as the course appointed to be read for entrance, comprises little more than Virgil, Sallust, and Horace, in one language; and Lucian, Xenophon, and Homer, in the other, I would recommend it to you occasionally, to refresh and extend your knowledge of the classics at your leisure hours. A knowledge of French is scarcely less necessary than that of Greek and Latin, for many of the most eminent works on Surgical subjects, have been published originally in that language, and have not yet been translated into our own; and fortunately for us, the study of French is one which requires neither much time nor much labour. A slight application for a few months, will enable you to read any Surgical author in this language, with sufficient facility.

But, besides a knowledge of the Classics, an acquaintance with the Sciences also, is necessary to complete the preparatory education of the Surgeon. And as the College has not yet fixed upon a scientific, as it has on a classical course, I shall take the liberty of discussing in order, the several sciences which most particularly demand your serious attention.

No science tends so effectually to strengthen the understanding, and to improve the reasoning faculties, as that of Mathematics; for it requires that complete retirement of the mind within itself, that straight-forward, unbroken progress of thought, which can alone enable us to follow up a long chain of arguments, and arrive at a remote conclusion. But besides the important benefits which are thus derived from the cultivation of this science, it is also in a great degree, the key to most of the other sciences. I would, therefore, recommend it you in the first place, to acquire a competent knowledge of Geometry, both for the purpose of improving your intellectual powers, and of assisting your studies in the various branches of Natural Philosophy. But, allow me to warn you, that the direct application of Mathematics to the science of Medicine, is altogether impracticable. Our predecessors indeed, dazzled by the success with which the immortal Newton had applied the principles of Mathematics to unfold the laws of Nature, conceived the preposterous design of making the science of Medicine a subject of Mathematical demonstration; and so confident were they, that the cure of Medical diseases could be made as certain as the solution of Mathematical problems, that one of them triumphantly exclaims, "Jam solvi nobile problema, dato aliquo morbo invenire remedium." An appeal to experiment, however, soon taught them that the fixed and immutable laws of Mathematics were little applicable to the science of Medicine: a science heretofore so unfortunately characterized by the instability of its principles.

Natural Philosophy will be found of great use, to explain some of the functions of the animal body, and the law's to which they are subject. Thus it is impossible that any person unacquainted with the general principles of optics, can form an accurate idea of the manner in which vision is performed in the natural state of the eye; and he consequently cannot clearly comprehend why distinct vision is in some persons, confined to objects close to the organ, while in others, those objects only which are placed at a distance can be seen distinctly. Without a knowledge of Acousticks, it is equally impossible for him to comprehend the manner in which the pulses of the air, strike upon the tympanum of the ear, so as to produce the sensation of hearing.

It would be tedious to enumerate all the particular instances in which you may apply the principles of Natural Philosophy to the study of Surgery. You should, however, be careful to apply them with the utmost caution. You should recollect that in the animal system, physical laws are often counteracted by the superior powers of the living principle. From an inattention to this fact, originated most of those errors in Physiology and Pathology, into which the great Boerhaave was betrayed. It was owing to this, that he conceived, the circulation of the blood through the arterial and venous systems to be subject to the same laws, which regulate the motion of fluids through inanimate tubes. A theory which, though perfectly consonant to the laws of Hydraulics, is yet totally incompatible with the laws of the living system. On these misapplied principles did he also account for the derangements which take place in the circulation from disease, and on this fundamental error is built his celebrated Theory of Inflammation.

Chemistry, Gentlemen, affords such a luminous explanation of the great Phænomena of Nature, and leads to such important improvements in the various arts subservient to human life, that mankind at large, must regard it most as a science at once most highly pleasing, and most eminently useful. To the Surgical student in particular, it is of indispensible importance. For without a knowledge of the Chemical properties of those substances which he uses in the composition of external applications, or of internal remedies, how is it possible for him to avoid combining together medicines, which though innocent or useful in themselves, may yet by their combination be rendered either dangerously active, or totally inert? Thus, if the practitioner were to administer flowers of Zinc to a child, and were at the same time to advise a mixture containing dilute Sulphuric acid, he would induce highly distressing symptoms, by thus combining together two medicines—each of which separately taken, would have been perfectly mild. On the contrary, if he were to combine together Vinegar of Squills, and Volatile Alkali, which are each of them useful expectorants, for the purpose of increasing their expectorating powers, he would produce a compound much inferior in utility to either of the medicines used singly. Nor is Chemistry of less use to the Surgeon in administering, than in compounding medicines. For unless he knows the Chemical combinations which a medicine is likely to form with the various substances which it may meet in the human body, how is it possible for him to know in any instance, that the effect produced, shall not be the very contrary to that intended? For example, Magnesia is in itself an inert substance with respect to the human frame, but should it meet with any acid when taken into the stomach, it then becomes an active purgative. Now, if a practitioner, from an ignorance of this property, were to administer the simple substance to a patient, in whose stomach no previous acidity existed, he would in all probability, not only fail in the object of evacuating the bowels, but might even cause a state of more obstinate constipation, than had before prevailed.

But the advantages which the Surgeon derives from the knowledge of Chemistry, are not confined to the composition and administration of medicines. This science is of still more material use to him, in elucidating several important phænomena of the animal œconomy; for by Chemical analysis, we acquire a more accurate knowledge of the component parts of many substances, which are secreted from the general mass of the blood, and lodged in various cavities of the body. Thus, we learn more clearly the composition of urine and of bile; and thus we gain a more distinct idea of certain morbid changes which take place in these fluids, as in the formation of biliary and urinary calculi. Nor perhaps will it be deemed too sanguine a hope, to expect that Chemistry may one day furnish us with remedies which shall posses the power of dissolving those concretions, and thus free mankind from the sufferings of a most painful disease, and the necessity of a most dangerous operation. In a word, Chemistry applied to the investigation of any phenomena in the animal system, which do not strictly depend on the vital principle, or employed to discover the composition of substances, which, though deposited in certain appropriated receptacles of the living body, are yet to be considered as not under the immediate influence of the living power: Chemistry, I say, applied thus far, will not only assist our researches into the animal œconomy, but may also ultimately guide our practice to a more judicious treatment. But this is the utmost extent of its utility to the healing art. Thus far, and no farther, are the principles of the one science applicable to the phænomena of the other. Here, nature seems to have fixed so immoveably, the common boundaries of both, that beyond those limits, it appears scarcely possible for Chemistry ever to extend her empire over the province of Medicine. I know how contrary this is to the prevailing opinion—I well know how fashionable it is to lavish on Chemistry the most unqualified praise, and to attribute to it the most unbounded utility to the study and practice of Medicine; but however popular the study of this fascinating science may be, however ardent the hopes, and enthusiastic the expectations of its admirers, I trust that I shall be able to satisfy your ingenuous and unprejudiced minds, that the vital properties of the human system, depend not on its chemical principles, and that the great and complicated operations of the animal œconomy are not subject to the same laws that govern the minute and detached particles of inanimate matter.

And if I shall thereby prove the means of preventing that total disgust, which you would naturally conceive to this science, on finding that your time and industry had been thus thrown away, upon an attempt no less laborious than impracticable: I am confident you will do me the justice to believe, that so far from being inimical to this beautiful and useful study, I am on the contrary, strongly actuated by a sincere solicitude for the advancement of its real interests.

To show how little the science of mutual affinities is calculated to *elucidate* the phænomena of animal life, we shall begin with an examination of the most simple facts, and from thence proceed to an investigation of the more complex.

For this purpose, we shall in the first place consider Chemistry, as applied merely to explain the composition and properties of the fluids, and the texture and uses of the solids. By chemical analysis then we discover, that all our fluids and solids (with the single exception of bone) are composed of nearly the same chemical principles, and that they differ from each other, chiefly by having those principles combined in different proportions—but how is it possible to suppose, that such slight differences in the proportions of the same elementary principles, can be the cause of such astonishing differences in the living properties? or indeed how is it possible, that any conceivable combination of chemical elements can impart any living property whatever? Can any chemical analysis teach us, for instance, why the elementary particles of animal matter combined in muscle, possess the astonishing properties of motion; or how those combined in nerves communicate the still more surprising properties of sensation. Or can it explain to us, why it is, that both these extraordinary agents retain their respective powers during life, and yet lose them immediately after death, although no alteration in their component principles have taken place? If the science of Chemistry then be insufficient to explain the more simple properties of any individual part, how can we expect it to elucidate the complicated process of any particular function? For example, can Chemistry elucidate the wonderful process of digestion, by which, dead vegetable matter is converted into living animal matter, and the food taken into the stomach, is made to participate in the sensations of the animal whose body it nourishes? If then Chemistry can neither explain the properties of individual parts, nor the process of particular functions—is it from this science we are to expect an explanation of the vital principle itself—that mysterious principle which pervading every part of the sentient system, at once directs, sustains, and harmonizes, all those wonderful and complicated movements of the animal machine?

Such are the considerations which induce me to think, that the value of Chemistry to the

Surgeon is extravagantly overrated by modern authors.

Had these wild ideas of the perfectibility of Medicine, by the aid of Chemistry, remained confined to the speculations of the theorist, I should have passed them over in silence; but when I see the crude and imperfect principles of animal Chemistry, extensively applied to the practice of Medicine, to detect the proximate causes of disease, to discover the appropriate remedies, and to explain the specific mode in which those remedies chemically operate, I feel it my bounden duty, to warn you, as strongly as I can, against so dangerous a delusion. And perhaps I cannot do this more effectually, than by stating to you some few of the many cases in which this attempt has been already made. The Chemico-Medical Philosophers of the French School, a few years since, laid it down as the theory of intermittent fever, that the disease consists in a general debility of the muscular fibre, arising from the defect of gelatin in the constitution, and from the imperfect fixation of oxygen or pure air in the gelatin. From this theory it immediately followed, that the proper remedy was to make gelatin the food of the patient, and to let him enjoy the benefit of fresh air. They therefore resolved to substitute this new medicine with the modus operandi, of which, they conceived themselves to be perfectly acquainted, for the established specific which cured the diesase, it is true, but cured it in a manner to them inexplicable. They accordingly did actually administer jelly for the cure of the ague, instead of peruvian bark. And what was the success of the remedy? Exactly such as any man of common sense must naturally have anticipated. Thus, by the misapplication of an useful science, have these men been induced to abandon the established and successful treatment of intermittent fever, and to adopt a practice perfectly inert, founded on a theory perfectly puerile. In the same manner, and with nearly the same success, have factitious airs been applied to the cure of pulmonary consumption, and oxygenated potash to the cure of lues venerea.

I have now pointed out to you, the course of preparatory study best suited to the Surgical Pupil, and have taken a general survey of the several sciences best calculated to assist either in the improvement of your understandings, or the advancement of your professional pursuits. And if there be any of you so unfortunate as not to have enjoyed all the advantages of a well-directed early education, I would earnestly recommend it to you to endeavour to supply that defect with all practicable expedition, by devoting to those studies, the leisure of your Summer months, and bestowing on those various sciences, an application proportioned to their respective importance.

You may perhaps think, that if the time required for those general studies, were devoted solely to the pursuits of your own particular profession, it would be more wisely and profitably employed. But this opinion is equally narrow and unfounded: for be assured, that no man can know his own profession perfectly, who knows nothing else; and that he who aspires to eminence in any particular science, must first acquire the habit of philosophizing on matters of science in general.

PLAN OF STUDY TO BE PURSUED BY THE SURGICAL PUPIL.

HAVING thus taken a view of the sciences necessary to be acquired before you enter on the study of Surgery, I shall now proceed to the consideration of those, immediately subordinate to Surgery itself, namely, Medicine, Physiology and Anatomy.

So inseparably connected are the two sciences of Medicine and Surgery, that he who hopes to practice either profession with benefit to his patient, or confidence in himself, must take care to combine the study of both. It is only from the mutual lights which these kindred sciences reflect on each other, that the Practitioner can reasonably hope to attain either superior sagacity in the discrimination, or superior skill in the treatment of disease.

The talent of discriminating diseases, of distinguishing that which is before us, from every other to which it may bear any possible resemblance, is of all others, the most useful to possess, and the most difficult to attain. But it not unfrequently happens, that Surgical and Medical Diseases mutually assume such a strong resemblance to each other, in their symptoms and characters, that it becomes a matter of serious difficulty to discriminate between them. In such cases then, the practitioner cannot possibly ascertain under which of them his patient labours, unless he be perfectly acquainted with the characters of both. For instance, if a Surgeon unacquainted with medical disease, were called to visit a patient affected with a recent inflammation of the testicle, he would in all probability, at once apply those topical and general remedies which the rules of surgery direct, instead of first ascertaining whether the disease had been preceded by a degree of fever and a swelling of the parotid gland. And thus, by mistaking a mere consequence of Cynanche Parotidæa for an original disease of the part affected, he might seriously endanger both his own character, and the life of his patient.

But medical knowledge is no less useful to the Surgeon in the treatment than in the discrimination of diseases. For it often happens, that a patient labouring under a surgical complaint, is attacked with a medical disease, which though not originally connected with the local injury, may yet act on it in such a manner, as to produce very material changes in its symptoms. Under those new and alarming appearances, the Surgeon, if ignorant of the origin and nature of the constitutional complaint, would be led to adopt a plan of treatment for the surgical disease, unnecessarily severe, or absolutely dangerous. Thus a patient labouring under a wound of the scalp, may be seized with idiopathic fever; and this disease may produce alterations in the wound, resembling those which take place when the parts within the skull are engaged in the injury. Were the Surgeon under those circumstances, ignorant of the causes of ordinary fever, he might rashly proceed to the operation of the Trepan, an operation in this case absolutely unnecessary, at all times attended with considerable danger, and that danger highly aggravated by the existing state of fever.

It may, however, be urged, that the Surgeon will find it more prudent in all medical diseases, to call in the aid of a Physician; but to this plan there exists an insuperable objection, namely, that in all dubious and difficult cases of mixed disease, an ignorance of Surgical diseases must incapacitate the mere Physician, just as much as an ignorance of Medical diseases can incapacitate the mere Surgeon. For instance, if a Physician be called to treat the fever which often attends strictures of the urethra, he might conclude from the similarity of the symptoms, that his patient was attacked by intermittent fever, and would accordingly pour in bark and other remedies, calculated for the cure of that disease, by which the symptoms of the fever would be rather exasperated than relieved.

Since then it is absolutely necessary for the benefit and security of the patient, that the Physician and Surgeon should each be acquainted with both Medical and Surgical diseases; that Surgeon must be inexcusable, who is found to want this combined knowledge. The additional labour necessary to acquire it is not great, and the Student will be amply recompensed, by an exemption from mistakes prejudicial to his professional character, and dangerous to the life of his patient. Let it not be supposed, that I would inculcate the idea of unnecessarily uniting the *practice* of both Physic and Surgery in the same person; on the contrary, I am decidedly of opinion, that in great cities the Surgeon should never undertake the cure of a case purely Medical, nor the Physician of a case purely Surgical. All I mean to assert is, that the *study* of both professions should be combined by the man who wishes to practice either to the greatest advantage. But this knowledge once acquired, the practitioner should direct his attention to one branch exclusively.

To such of you as intend to devote your professional services to the army or navy, I cannot too earnestly recommend an early application to the study of Medicine; for you will find on entering into the service, that the principal part of the cases committed to your care, belong to the class of Medical Diseases, and as in that situation there is no possibility of calling in the aid of a Physician, the lives of numbers must depend solely and entirely on your Medical skill. Study therefore, all Medical diseases in general, but study those with peculiar attention, which are most incident to the military or naval life. Study them not in books but in nature—and instead of artfully and unconscientiously making yourselves up to pass your examination, let it be your care seriously and efficiently, to prepare yourselves for the awful responsibility that is to devolve upon you.

PHYSIOLOGY, which comprises a knowledge of the living actions of individual parts, and of the various functions of the animal system in a state of health, must obviously strike you, as being of essential importance to the Surgeon. For without a knowledge of the healthy actions and functions, how can he know which of them are disturbed by disease? How can he undertake to regulate them when out of order? How is he to check them when excessive—or to rouse them when languid? It is impossible for a man ignorant of the operations and resources of the system, to say, that any disease is such as cannot be relieved or remedied by the operations of the system itself; but that the destruction or removal of the diseased part, is the only means left to rescue the patient from the ravages of this irremediable malady. In order to acquire a knowledge of this science, you must make yourselves acquainted with the structure of the various parts. For we shall find that the nature of some of the functions will be best elucidated, by an investigation of the organs concerned in that function. Thus the structure of the heart, the valves or floodgates which are situated in the cavities of that organ, and in the mouths of the large vessels connected with it, and the direction in which these valves open, show most clearly the course in which the blood must necessarily flow. From not attending to the structure of this organ, Physiologists long remained in the dark on this subject, and framed the most fanciful and wild hypotheses, until the immortal Harvey proved the real course of the blood, from the anatomical structure of these parts. However necessary it may be to investigate the structure of our several organs, it must yet be confessed, that the Anatomy of any one animal cannot explain all the functions of that animal's body; and this is more especially the case in man, and in the higher orders of animals, which have their organs composed of a structure more delicate and complex, fitting them to produce those numerous and varied effects, so difficult of comprehension. The ultimate texture of our organs is often so complex and minute, as to elude the severest scrutiny of our senses. Under these circumstances then, we should despair of ever arriving at a knowledge of many functions of our own body, if we did not reflect, that in the inferior orders of animals, as each function becomes less perfect, the organization on which it depends becomes more simple. By comparing them together, the corresponding organs in various animals, we can ascertain in what part of the organ resides the structure essential to the performance of that function—and which are those parts that may be considered as only contributing to render the function more perfect. But it is much to be lamented, that a considerable portion of this branch of science is not established on such secure foundations, but seeks for support from loose analogies, or vague hypotheses. You should, therefore, carefully weigh the degree of credit which is to be attached to each theory in Physiology, and allow your practice to be guided only by those which are found to be of sterling value.

Among all those sciences which are subservient to the profession of Surgery, Anatomy justly challenges the first and highest rank; it is not only of the greatest importance, but of the most indispensable necessity both to the study and practice of Surgery. It is, in fact, the very basis of all Surgical education, the only foundation on which a solid superstructure can be raised. But it is much to be lamented, that the very science which, of all your professional studies, is the most important and indispensable, should be at the same time beyond all comprehension, the most difficult and disgusting. It is greatly to be regretted, that the Student should find it so hard to acquire a knowledge of Anatomy, and the Practitioner should so soon lose that anatomical knowledge which had cost him so much time and labour to acquire. It may be therefore not without its use to examine, whether a knowledge of this science can be acquired with greater facility, or employed with greater effect than at present? Let us for this purpose enquire, in what consists this difficulty of which we so universally complain. Does it arise from the abstruse and complicated nature of the subject itself? or is it not rather owing to some radical defect in our method of investigating it?

That the study of Anatomy is encompassed with many natural and unavoidable difficulties; that the science is of vast extent and infinite variety; and that the multiplicity and diversity of the objects it presents, must at the first view, oppress and bewilder the Student—all this I do not hesitate frankly to acknowledge. These are, certainly, difficulties inherent in the subject, and inseparable from it, these are obstacles which nature herself has opposed to our progress, obstacles which we cannot remove, and which we must therefore only labour to surmount.

But admitting the existence of all those natural difficulties in the fullest extent, still I cannot help thinking, that some of the most formidable evils of which we complain, are those we have ourselves created, and that many of the most serious obstacles we have to encounter, are actually those we have thrown in our own way. It is, in fact, our deviation from that line of study which the nature of the subject points out, that renders a knowledge of Anatomy so difficult to acquire, and almost as difficult to retain; it is this that obstructs the progress of the youthful Student, and excites the apprehensions of the experienced Practitioner.

What the particular defects are in the present mode of study, that chiefly contribute to retard the acquirement of anatomical knowledge, I shall now endeavour to explain.

In the first place, the authors of all elementary systems of Anatomy, describe the various parts of the human frame as if all of equal importance, instead of giving to each part, just that degree of attention it deserves, and no more. Thus they are as full and circumstantial in their descriptions of the minute ramifications of an artery or nerve, as in that of the trunk or principal branches; by these means the mind is overcrouded with a collection of so much superfluous matter, and the memory over-burdened by the pressure of so much dead weight.

The language too, in which these descriptions are conveyed is no less tedious, than the descriptions themselves are trifling. By labouring after a minute and unattainable accuracy, it serves only to impress an idea of difficulty, where no difficulty really exists.

Another essential mistake is, that of considering Anatomy in no other light than as a science in itself, distinct and independent of any other, instead of considering it as a science altogether subservient to the practice of Medicine or Surgery. Hence the inexperienced Student, taught to regard Anatomy, without any reference to its uses, views it only as a collection of detached and uninteresting facts, and a catalogue of barbarous and unmeaning terms. Whereas, had he in every step of his progress, been shewn the connexion between the anatomical structure of each part, and the surgical diseases and operations to which it is subject, he then would have had such a lively interest excited in his mind, as must have impelled him to overcome the natural difficulties of the study, and must have fixed in his memory an indelible impression of the structure of the parts.

But the principal and parent error arises from misapplication of that which has been of so much utility in the study of other sciences, and which, if not carried to excess, would have been equally useful in this—methodical arrangement. How far this principle has proved injurious, and how far it has been productive of real advantages, it may be of some importance to distinguish.

The profound and comprehensive mind of the philosophic Bacon, having discovered and demonstrated the necessity of methodical arrangement in the cultivation of the sciences, Anatomists hastened to avail themselves of its advantages; they accordingly divided this science into several distinct branches, as Osteology, Myology, Neurology, corresponding to the different distinct parts of the animal frame. These divisions they termed Systems. Each system they described separately, without taking any notice in this description of its connexions with the other systems, unless where it happened that, that which was the immediate subject of examination, should have remained absolutely unintelligible, without such a reference. And succeeding Anatomists have ever since continued to tread implicitly in the footsteps of their predecessors. By these means we are certainly enabled to examine the several parts with an accuracy, and to describe them with a precision before unknown. But though the description of each particular part be now more perfect, yet the plan is still so far defective, that the description of any one part seldom reminds the Student of any other, the examination of any one system seldom leads him to trace its connexions and relations with the other systems, nor do so many detached views of the several parts enable him to take any general and connected view of the whole. Thus, the Student who has been shewn the distribution of the venous, arterial, and nervous systems of the arm, does not know how each of them lies with respect to the other, at the bend of the elbow, and therefore he knows not how he should attempt, in cases of aneurism, to pass a ligature round the artery, without at the same time including its accompanying nerve, which communicates sensation to the principal part of the limb. Nor can he, in the common operation of bloodletting, account for that sharp pain of which the patient particularly complains, when the basilic vein is opened, because these detached descriptions of the different systems did not lead him to observe, that some considerable branches of the nerves run down along the face of this vein. In short, an attempt to explain the nature and structure of the animal machine, by dividing the several parts of which it is composed, into distinct classes, and then giving only a detached and unconnected description of each class, without ever considering them as the component parts of one organized whole, is, in my mind, as preposterous and unavailing, as would be an attempt to explain the mechanism of a watch, by taking it to pieces, and giving a separate description of every particular wheel and spring, without afterwards attempting to shew by what contrivance the one moves the other, or how each wheel contributes by its particular motion, to regulate the general movements of the whole machine. Is it then to be wondered at, that a plan so little calculated to excite industry, or stimulate curiosity, a plan which so far from shewing the subservience of Anatomy to Surgery, does not even teach Anatomy itself as a distinct science; a plan which leaves the whole weight to press on the memory, and that too, in the most unfavourable manner, should have but few attractions for the youthful Student? Is it surprising that he should consider the study of the science a drudgery rather than a pleasure?

That he should take it up with disinclination, and turn from it with disgust? In fact, the Student who has been employed in acquiring an anatomical knowledge of the different divisions or systems of the human body, has but encountered all the difficulties, without securing any of the benefits. For such a plan of study can neither enable him to form a perfect idea of the structure of any part of the body; nor can these partial and detached views of the Anatomy, in any degree qualify him to perform a surgical operation. The study of Anatomy too generally ends at that point where it begins to be useful.

While Systems of Anatomy are multiplied beyond number, we have scarcely any elementary treatise, the sole object of which is, to describe the relative position of the parts, or point out the subserviency of anatomical knowledge to surgical practice. To supply that defect for the pupils of this school, is the design of the present work.

If it shall enable you to trace for yourselves in the Dissecting-room, those parts which are most necessary to be known; if, when you retire to your closet, it shall assist to imprint on your memory, a knowledge of those parts which you had previously dissected; if it shall explain to you the different operations in Surgery, and demonstrate to you the anatomical principles, on which each step of every surgical operation is founded, the views of its author will be fully accomplished.

You may possibly think it a defect, that this work is not accompanied by plates; and as it has of late become so customary to embellish professional works with splendid engravings, I feel it necessary to account for the omission of them on the present occasion.—Had they been added, the price must necessarily have been too extravagant for an elementary treatise. Nor do I conceive them essential to you, as the surgical pupils in this city, enjoy such unbounded opportunities of seeing the parts displayed by dissection.

THE

ANATOMY

OF

INGUINAL, CRURAL & UMBILICAL HERNIA.

ANATOMY OF INGUINAL HERNIA.

THE structure of the parts concerned in Inguinal and Crural Hernia, has of late, much occupied the attention of our most able and industrious Anatomists. The very valuable discoveries which they have made, have led them into a most minute detail of the situation, connexions, and origins (as they term it) of the different fasciæ which constitute so material a part in the anatomy of those diseases; but this very great minuteness, so necessary to the description of newly discovered parts, appears to be one cause of that embarrassment and difficulty of which the Pupil so generally complains, when engaged in the study of those parts. Fortunately for him, however, the Description of this piece of Anatomy is much more complex, than the Dissection is difficult.

I have attempted a description of those parts as they present themselves on dissection, observing such an order as may enable the Student at the same time, to comprehend the connexions, extent, and uses of those parts. In some particulars, I have ventured to differ from the received opinions; but I trust, that the descriptions here given, will be confirmed by dissection, will elucidate some of the obscure parts of former descriptions, and may lead to useful practical inferences. Two plates have been added, to illustrate the structure, of which it was found impossible to convey a clear idea, by any verbal description.

Mode of commencing the dissection. Make a transverse incision through the skin, from the spine of the Ilium to the linea Alba, and a perpendicular one from that to the Symphysis pubis, begin to raise the Integuments at the spine of the Ilium, where you know the fleshy part of the external abdominal muscle lies; in doing this, be careful not to raise along with them a fascia which lies between them and the external abdominal muscle, and which is termed the Fascia Superficialis; Fascia Superficialis. continue the dissection until you have raised the skin which covers the upper third of the forepart of the thigh. In this stage of the dissection you may observe, that this superficial fascia is not confined to those parts which are ordinarily the seat of rupture, you may by a little pains, trace it up over all the forepart of the body and throat, and Its extent. down upon the thigh. When we come to speak of the anatomy of the limbs, I shall point out to you what share it has in some of the morbid conditions to which these parts are subject. Your notice will now be attracted by a long and pretty large vein lying upon the surface of this fascia, this vein you see rising through the fascia of the thigh, turning over the edge of Pouparts ligament, at the distance of an inch and a quarter from the tuberosity of the pubis, directing its course towards the umbilicus, and as it approaches this point, becoming gradually smaller, in consequence of the numerous branches which it has given off on each side; this vein is accompanied by an artery which is sometimes of pretty considerable size, and which is one of the branches of the external pudendal artery. These vessels then are liable to be wounded in the operation for Inguinal, or Crural Hernia; and the division of this vein, and its accompanying artery, might yield such an effusion of blood, as would embarrass the Surgeon in the commencement of his operation, if he chanced to be unacquainted with its source. Now raise the superficial fascia, by making an incision from the spine of the ilium to the linea alba, and continue its dissection down upon the forepart of the thigh, as low as you had made the dissection of the skin; cut across the fascia where it goes down to cover the penis, and reserve the examination of this portion, until you come to investigate particularly the anatomy of the genital organs. In raising the fascia you will observe, that it is more closely connected with Pouparts ligament, than with any other of the sub-

Branches of the arteria and vena pudenda

Liable to be wounded in the operation for Crural or Inguinal Hernia

Mode of dissecting the Fascia Superficialis.

Connected with Pouparts ligament.

Relation of Fascia Superficialis to Inguinal glands.

Effects of it on Inguinal glands when they are Inflamed.

jacent parts, and that it is also attached to the pubis, in consequence of which attachment, it may make a considerable degree of pressure on Inguinal Hernia.—On raising this fascia from the groin, you expose to view, the numerous Inguinal lymphatic glands. These, lying under this fascia, will be materially affected by it, whenever they fall into a state of inflammation; for in this condition of those glands, very considerable pain will be induced in them, by any posture which will put this fascia on the stretch, and hence it is, that patients labouring under inflammation of those glands, will experience an increase of their sufferings when the body is erect, and a mitigation of them when the fascia is relaxed, either by the body being bended forward, or by the thigh being raised upward.

Ring of external abdominal muscle.

Difficult to discover

How to discover its place.

The external abdominal muscle being thus exposed, you often observe near to Pouparts ligament, two or three bands of tendinous fibres more thick, with intermediate portions more thin than ordinary, so as to afford a remote resemblance to the descriptions given of the abdominal ring; while in the site of the ring itself, the structure of the parts is much more uniform and smooth; so that an unexperienced person cannot readily discover the real place of the ring in this stage of the dissection. Catch with the forceps the spermatic chord, as it passes over the face of the pubis; gently pull it, and you observe it coming out from under a very thin fascia; pass the handle of your knife between this fascia and the chord up towards the spine of the ilium, and you will perceive the texture of this fascia gradually to become thicker, as you ascend towards the ilium. It is this small fascia which passing from one pillar of the ring to the other, and connecting itself to each, which had concealed these pillars from your view. This membrane nearer to the ilium, is of a ligamentous texture, but as it descends it loses of its ligamentous nature, and degenerates into a cellular structure, but may in many subjects be traced for a quarter of an inch along the spermatic chord. If you now recollect that by frequent distention and repeated slight attacks of inflammation, this cellular and tendinous structure becomes thicker; you will understand, that in performing the operation for Inguinal Hernia, you may not, after you have divided the skin and superficial fascia, be able to discover the abdominal ring. You will therefore not feel embarrassed, when, instead of this opening with well defined borders, you find close to the surface of the abdominal muscles, the tumour covered at its neck, by this ligamentous membrane, which now, in consequence of thickening and distention, is seen to descend perhaps for half an inch along the tumour. Consider now, in what manner you can most readily introduce your knife between the Hernia and abdominal ring; and from the present view of the anatomy of the parts, it is plain

Fascia which conceals the ring.

Its extent.

How altered by disease.

Effects of this in the operation.

How to proceed in this step of the operation.

that this will be best effected by dividing this fascia about a quarter of an inch below the abdominal parietes with cautious touches of the knife.

From the course in which the spermatic chord is seen to run down along the forepart of the pubis, you may infer that, in the old manner of applying the pad of the truss upon the external ring, there was some danger that the chord would be compressed between the instrument and the bone. The pain caused by this, you must suppose, would be very great, and yet it has been submitted to, by some patients, for a length of time, at least, sufficient to produce serious diseases of the chord or testicle. Observe now, that the spermatic chord does not completely fill the external ring, and that a quantity of loose cellular substance occupies the remainder of the aperture. Next turn your attention to the situation of the ring relatively to the pubis, as a familiar knowledge of this will assist you in deciding on the nature of many obscure and complicated diseases, which occur in the vicinity of this part. Before you displace the external abdominal muscle, make yourself familiar with the course of the spermatic chord along Pouparts ligament, as it approaches the pubis. When you pull the chord, you can mark its course close to this ligament, and can see that it is very loosely connected to the parts on which it lies, by a lax cellula substance.

Ill effects of misapplying the truss.

Course of spermatic chord.

Further dissection of external oblique.

Now raise the lower part of the external muscle, by making an incision from the spine of the ilium across to the linea alba; when you have separated it from the subjacent internal oblique, so low down as within one or two inches of Pouparts ligament, you should divide the raised portion by a perpendicular incision, which shall run midway between the spine of the ilium and spinous process of the pubis, and shall be continued down nearly to the ligament. By this step you will be enabled to throw down the external oblique upon the forepart of the thigh, and thus gain a view of the parts it had covered. The most important of these is the spermatic chord; observe the groove in which part of its course is run; this groove you see is formed anteriorly, by that portion of the tendon which is visible on the external view; the under part of the groove is formed by a folding in of Pouparts ligament, which passing backwards, is fixed to the crest of the pubis or ileo pectineal line; and this is termed the third insertion of the external oblique. This third insertion is not visible in the external view of this muscle, and yet it acts a very important part in Femoral Hernia, as shall be explained when treating of the anatomy of this species of Hernia. The united tendons of the internal oblique and transversalis muscles form the posterior part of this groove.

Groove in which the chord runs

How formed.

Internal oblique muscular.

The internal obliqueis seen arising from the inner surface of Pouparts ligament, so far forwards as two-thirds of its length from the spine of the ilium; here the spermatic chord passes under the edge of this muscle, and here those muscular fibres, which are termed the cremaster muscle, are seen passing down on the face of the chord. These are intimately blended with the fibres of the internal oblique, so that no very marked division between them is to be seen naturally, although with the knife we can trace a distinction. In this stage of the dissection you will observe, that in some points of view, this bundle of muscular fibres appears to come from under the edge of the internal oblique, and to have arisen from the tranversalis. In short, this view of the parts will enable you to account for the different descriptions of the origin of the cremaster, as given by some of the most able anatomical authors. From this view of the parts also, you will perceive that the older anatomists who spoke of the ring in the internal oblique, were misled by the intimate connexion between that muscle and the cremaster. You should now raise the cellular substance from the anterior surface of the chord, and thereby gain a distinct view of the cremaster along its whole course. Remark now, the scattered order of its fibres, and what is of more consequence, remark how loosely those fibres are connected with the chord, and how easily a hernia may either by gradual descent, or by sudden protrusion detach them from the chord and tunica vaginalis of the testicle.

Cremaster

Apparently arising from transversalis.

Loosely connected with chord

And easily seperated by Hernia.

Now raise the internal oblique, that you may obtain a distinct view of the lower portion of the transversalis muscle, and its relation to Inguinal Hernia. The most easy mode of effecting this, is to make an incision from the spine of the ilium along its crista, cutting down through the muscular fibres until you come upon the circumflexa iliaca vein and artery, which, being surrounded by much cellular membrane, form at this place a very marked division between these two muscles; having thus ascertained the depth of the muscular fibres which belong to the internal oblique, you proceed to raise this muscle, but when you have advanced to its tendinous expansion, you will be at a loss to ascertain how much of this belongs to each muscle respectively. We may therefore say, that the combined tendons of these two muscles, form a common thin tendinous expansion, which passes anteriorly to the rectus muscle, until it reaches the linea alba, while its lower edge, leaving Pouparts ligament, is stretched in an arched form over the spermatic chord, and then inserts itself into the crest of the pubis, this insertion being continued onwards even to its symphysis.

To raise the internal oblique.

Conjoined tendons of the internal oblique and transversalis.

It must, however, be admitted, that this tendon is, in general, so closely connected with the fascia transversalis, that no regular, well defined line can be observed, as marking the edge of the tendon, on the inner side of the chord; nor can we say positively, at what point, this tendon ceases to be attached to the crest of the pubis.

Has not an opening for passage of spermatic chord.

It has not any opening for transmitting the spermatic chord; but its lower edge stretches over this process, immediately on its passing through the internal abdominal ring.

Too weak to prevent protrusion of bowels.

The texture of this tendinous expansion, is not uniform, close, nor strong, from which you will readily infer, that it is incapable of affording any great security, against the protrusion of the bowels, through the parietes of the abdomen, immediately behind the external ring; and therefore, that we should, in all probability, be more subject to Hernia of this description, had not this part been strengthened by some other means; these we shall describe when speaking of the fascia transversalis.

Before you displace the transversalis muscle, attend to the course of the spermatic chord, as it passes beneath it, and you will perceive, that this takes place, at a point still more externally, or nearer to the ilium, than the place where it had passed under the internal oblique.

Arch under which the chord passes.

We have thus seen, that the spermatic chord passes under an arch, formed by the edges of the conjoined tendons of the internal oblique, and transversalis, and not through any aperture in those muscles.

The size of this arch, is much more than sufficient for transmitting the spermatic chord, and we should be liable to frequent protrusions of the abdominal viscera, at this point, had this arch been the first opening, through which the spermatic chord was to pass, in its descent to the scrotum.

How the viscera are prevented from entering into this arch.

We accordingly find interposed between these tendons and the abdominal cavity, a fascia which lines this arch, and at the same time affords the first aperture of that canal, by which the spermatic chord is to pass through the parietes of the abdomen.

Mr. A. Cooper's discoveries

For the discovery and description of this fascia and its opening, the Profession must ever feel the most serious obligations to Mr. Astley Cooper, as heretofore our knowledge of the Anatomy of these parts had been incomplete, and consequently our operations for the cure of Inguinal Hernia, had been founded on uncertain rules, and unnecessarily exposed to dangerous accidents.

Fascia transversalis.

The exact description of this fascia, we must reserve, until we are examining the structure of the parts engaged in Femoral Hernia; at present we shall merely observe, that this is a fascia, which, attaching itself to Pouparts ligament and the crest of the pubis, is continued upwards on the anterior part of the abdomen, lying between the peritoneum and the transversalis muscle; in this facia is an opening, which Mr. Cooper calls the internal abdominal ring. This is situated about half an inch above Pouparts ligament, and its inner edge is midway between the spine of the ilium, and the symphysis pubis. To discover the fascia, cut cauti-

Internal abdominal ring.

ously through the fibres of the transversalis muscle, and as you raise the muscle, this fascia becomes exposed. The opening in the fascia cannot yet be clearly seen, because a thin cellular substance, passes from the edges of the opening, along the spermatic chord. Make an incision at half an inch anterior to the fascia, round the chord, through this cellular substance, and then strip it up towards the fascia. By this proceeding, the ring will be plainly seen, with its inner and its lower edges well defined and pretty thick, while its outer and upper edges appear very indistinct and thin.

To dissect the internal abdominal ring.

Thus you have seen, that the spermatic chord passes through the various layers of parts, at points not immediately opposite to each other, by which structure, the strength of the parietes of the abdomen has been preserved, and the occurrence of Hernia rendered much less frequent.

Obliquity of Inguinal Canal.

The obliquity of this course is such, that the length of the canal, along which the chord runs among the abdominal parietes, or the distance between the internal and external rings, is one inch and a half, while the depth of the parietes is not equal to a quarter of an inch. In this stage of the dissection, you will study well the situation of this opening, mark its position, with respect to the spines of the ilium and pubis, to Pouparts ligament, and to the external abdominal ring. Remember, that as this is the first part of the parietes of the abdomen, at which Inguinal Hernia ordinarily begins to descend, so this is the spot, at which you are particularly to look for suspected Hernia, either in those who labour under symptoms indicative of the disease, or in those whom you inspect for the service of the army or navy. Again, as the chance of curing Hernia by wearing a truss depends on our being able to close up, or restore to its natural state, that opening at which the bowel protrudes, it is obvious, that the instrument should be made to press on this point, or on the internal abdominal ring; for pressure applied to any part below this, leaves the mouth of the sac open, and ready to receive the viscera on any future exertion.

At this point search for suspected Hernia.

Here pad of truss to be applied,

and why.

Let us now take a view of the relations, which the ordinary species of Inguinal Hernia has, to the different parts in its vicinity. We first observe, that as the spermatic chord and this species of Hernia have the same course, so must they hold the same relative position, to the epigastric artery. You see that the epigastric artery runs at the inner edge of the internal abdominal ring, that it lies posterior to the fascia transversalis, between it and the peritoneum, gradually coming up through this fascia, until it has arrived about midway, between the pubis and the umbilicus; that it here meets the lower edge, of the sheath of the rectus, formed by the conjoined tendons of the internal oblique and transversalis muscles, and that insinuating itself between the sheath and the rectus, it runs along the posterior surface of this muscle. Now, as this artery,

Relative position of Inguinal Hernia to various parts.

Position of Inguinal Hernia to Epigastric artery.

Course of this artery

in the natural state of the parts, lies along the inner edge of the internal ring, and as this species of Hernia, descends in the same course with the chord, it follows, that the artery must be on the inner or pubic side of every such Hernia, as it is passing through the internal ring; so that, if a division of the inner edge of this aperture be made, by carrying the knife in a direction towards the linea alba, this artery must inevitably be divided. But when the Hernia, having passed through the internal ring, has descended to the edge of the transversalis muscle, it must at this place, lie anterior to the artery; so that, if we had occasion to divide the edge of this muscle, the artery could not be endangered, as it is removed out of the reach of the knife, by the interposition of the Hernia.

How endangered in the operation.

When free from danger.

In short, the epigastric artery can only be wounded in operations on this species of Hernia, when the knife is passed so deep, as to enter into the internal abdominal ring, and then carried towards the linea alba. To give you some idea of the inportance which should be attached to Mr. Cooper's discovery of the fascia transversalis and internal ring, I shall transcribe the sentiments of the celebrated Peter Camper on this subject,—' In herniis ' igitur, inguinalibus, arteria & vena Epigastrica ' versus pubem a prolapsis intestinis compelluntur, & radicibus suis sub herniis sitæ, nullo ' modo in bubonoceles curatione scalpello at- ' tingi possunt. Suspicor Chirurgos deceptos 'fuisse magnâ, & violentâ profusione sanguinis, 'quæ ex pudendâ externâ semper provenit, simul 'ac scrotum secundum longitudinem dividitur.'

Relation of Hernia to Cremaster.

Cremaster, one of the anterior coverings of the Hernia.

Next, with respect to the cremaster muscle; as this comes off from the lower edge of the internal oblique, it must be anterior to the Hernia while passing under the edge of the transversalis muscle, and therefore the Hernia must either force its way through the fibres of the cremaster muscle, or it must insinuate itself between it, and the chord on which it has lain. The former occurrence, I believe, has never been observed; the latter has so invariably been the case, that the situation of the cremaster muscle is one of the means, by which we judge of the nature of the Hernia. We must therefore expect, when operating on the ordinary form of Inguinal Hernia, to meet with the cremaster, as one of those parts which cover the tumour on its anterior surface, and this will invariably happen, whatever may be the relative position of the Hernia, with the chord.

Relative position of spermatic chord and Inguinal Hernia.

Chord anterior.

Chord split

From numerous instances, and from respectable authorities, we learn, that the relative position of the chord and the Hernia, varies materially in different instances. Thus, the entire chord has been found to lie, on the anterior surface of the Hernia, instead of lying in its more usual, and more natural situation, behind the Hernia. The chord has been found, as it were, split or divided by the Hernia; its blood vessels running anteriorly, while the vas deferens ran behind the Hernia. This you can satisfactorily account for, if you will recollect, how the constituent parts of the chord diverge from each other at the internal ring, by the vas deferens passing down into the pelvis, while the artery and vein run along the edge of the psoas muscle. Hence you see the possibility of the chord being split by the Hernia, forcibly pushed down, and thus its vascular part, may be found lying anterior to the Hernial Sac, while the vas deferens lies behind it; or the vas deferens may be on the internal, while the blood-vessels run on the external side of the Hernia. Other varieties in the position of the chord, have been described by Authors. Hence we see what caution is required, when we are cutting through the parts which cover Inguinal Hernia, lest we injure, irretrievably and unnecessarily, the structure and functions of the testicle. It must, however, be confessed, that the spermatic chord is, in general, found to lie behind the Hernia.

How accounted for.

Caution in the operation indicated.

From the connexion which Inguinal Hernia has with the Spermatic Chord, you must expect that those diseases to which the Chord is subject, will bear a resemblance, more or less strong to this form of Hernia. Thus, when water, collects, in a cyst on that part of the Spermatic Chord, which lies in the Inguinal Canal, forming encysted Hydrocele of the Chord, the appearance and feel of the parts, will not be such as to constitute a satisfactory distinction between these diseases. We must then de-

Diseases which muſt resemble Inguinal Hernia.

Hydrocele of the chord resembles Inguinal Hernia.

pend, a good deal, upon the history of their origin and growth, and also upon their attendant symptoms.

Hydrocele of Tunica Vaginalis testis.

Sometimes the fluid of a Hydrocele of the tunica vaginalis testis, distends this sac upwards, and raises it even so high, that part of it shall pass within the external abdominal ring; here the form of the diseased parts, and the impulse which each receives from the abdominal muscles in coughing, add to the difficulty of a Diagnosis.

Varicocele, mistaken for Inguinal Hernia.

How to be distinguished.

Varicocele or enlargement of the spermatic veins, has been mistaken for Hernia, as both are similarly affected by posture and exertions. But a line of distinction may thus be drawn.—Place the patient in a recumbent posture, until the veins have had time to unload themselves, then, with the fingers firmly catch the spermatic chord close to the abdominal ring; let the patient now stand up, and if the disease be a Varicocele, the tumor will soon reappear and increase in size, as the veins cannot now return their blood, being prevented by the pressure: but if the disease be an Hernia, the tumor cannot appear as long as the pressure against the ring is kept up. I have known the varicose state of the chord, combined with Hernia: this threw great obscurity on the nature of the disease, and caused great difficulty in remedying it, as the pressure of the truss for retaining the Hernia, increased the obstruction in the spermatic veins.

Testicle which has not passed the external ring

There is no disease more difficult to be distinguished from Hernia than an inflamed state of the testicle, which having passed through the internal abdominal ring, remains covered by the tendon of the external abdominal muscle, not having descended so low as to escape through the second ring. How closely this must resemble a variety of Inguinal Hernia may be readily inferred; for the situation of the tumor is precisely the same in both cases, and the symptoms attending inflammation of the testicle, thus situated, exactly correspond with those of strangulated Inguinal Hernia. To these difficulties we must add, that the Surgeon is apt, at once, to set down the case as incarcerated Hernia, a complaint with which he is familiar, and does not suspect the existence of a disease which must be extremely rare.

Inflamed lymphatic glands, mistaken for Hernia.

Inguinal Hernia, may be confounded with inflammation of the lymphatic glands in the vicinity of the spermatic canal. I do not suppose that any Surgeon of competent Anatomical knowledge, could mistake it for inflammation of those lymphatic glands which lie in the fold of the groin; but an enlargement, whether from a venereal, or any other cause, of two lymphatic glands which lie on the side of the abdomen, as high up, but rather more internally than the internal abdominal ring; an enlargement of these glands will produce appearances, resembling those of Inguinal Hernia.

A knowledge of the parts concerned in this disease, constitutes the best foundation, upon which we can establish useful and safe rules, for the Surgical treatment of Hernia. When we attempt the cure by the taxis, as Surgeons technically term it, our efforts will be assisted by all those means, which tend to encrease the capacity of the abdomen, and diminish the resistance of its walls. It is obvious too, that the openings through which the viscera have passed, should, as much as possible, be relaxed, and the intestine be pushed back along the same route, by which it had descended. Most of these benefits will be obtained by placing the Patient in a proper posture. We should therefore lay the Patient on his back, with his head and pelvis raised by pillows, his thighs drawn up towards the abdomen, and the knee of the affected side turned inwards. Mark the effects of this posture on the walls of the abdomen, and on the apertures through which the Hernia had passed.

Taxis.

Principally by posture.

Effects of this on the boundaries of the abdomen.

The lumbar vertebræ, instead of forming an arch with its convexity projecting into the cavity of the abdomen, now present a concave surface towards that cavity. All the abdominal muscles are relaxed, by their points of origin and insertion, viz. the thorax and pelvis being made to approach each other.

While this posture removes every resistance which might be offered by the parietes of the abdomen to the return of the viscera, it affords the most effectual means of relaxing the borders of those apertures through which the bowels had escaped, and to a certain degree, relieves them from pressure and stricture. For the pressure of the

On the Inguinal canal.

fascia superficialis is removed; by this fascia being relaxed, particularly at the groin. The external ring will, in some measure, partake of the relaxed state of the external abdominal muscle in which it is formed. The state of the external abdominal muscle, and the relaxed condition of the fascia lata of the thigh, produce a most complete relaxation of Pouparts ligament, which is now made quite slack. From this state of the ligament, most material benefits arise. For thus the arched edge of the conjoined tendons of the internal oblique and transversalis muscles, the fascia transversalis and its aperture, the internal ring, are all relaxed; because these muscles and this fascia are so intimately connected with Pouparts ligament, that the former must partake of that state of tension in which the latter is placed.

Mode of performing the taxis.

Having secured all these advantages by the position of the patient, you may now proceed to return the viscera. For this purpose, you will grasp the tumour with one hand and raise it up towards, but not press it against the abdominal ring, while with the two first fingers and thumb of the other hand, you compress the neck of the Hernia, and then endeavour to push it up in the direction of the Inguinal Canal, viz. towards the spine of the ilium and slightly upwards. From this line of direction you will deviate in old Hernia, because in these, the long continuance of the disease tends to draw the two rings more and more opposite to each other.

Direction in which it is to be returned.

Except for old Hernia

A small portion of the tumour being returned, affords reasonable grounds for expecting that the rest will follow. But take care that you be not deceived by the contents of the Hernia passing backwards into the upper portion of the scrotum, instead of being returned into the cavity of the abdomen. You may flatter yourself, on feeling the contents of the Hernia recede under the pressure, that they are returning into the cavity of the abdomen. The elastic state of the tumor; the facility with which the lax texture of the scrotum can receive it; the difficulty with which it is made to repass the external ring; and the situation of that ring so near to the edge of the pubis, all conspire to render this deception more frequent. By such a mistake, not only will the object of the operation be for the time frustrated, but the safety of the patient will be materially endangered: for the intestines must be here forcibly pressed against the bone of the pubis, and thus subjected to a degree of violence equally dangerous and useless; but all this mischief may be avoided by directing the pressure upwards and outwards in the line of the Inguinal Canal.

Hernia appears to return when it is only pushed into back part of scrotum

Cause of this deception.

Ill effects of such mistake.

As the best directed efforts must often fail, from causes which it is unnecessary here to enumerate, let us consider what rules of practice the operator can derive from his knowledge of the anatomy of the parts engaged in Inguinal Hernia.

Circumstances which point out the necessity of caution in this operation.

Before the Surgeon proceeds to this operation, he should recollect the occasional deviation of the spermatic chord from its ordinary position; he should also recollect that the fascia superficialis is naturally of different degrees of thickness, in different individuals; that the cellular substance surrounding the spermatic chord, may be much thickened by this disease, or it may constitute but a very thin layer. A recollection of all these circumstances will impress his mind strongly, with the propriety and even necessity of slow, and cautious proceedings. "Festina lente," is a rule more applicable to this than to any other operation in Surgery.

Mode of performing the operation.

The Surgeon, when about to perform this operation, will grasp the tumour behind with his left hand, that he may at the same time, make steady the parts on which he is to operate, and make tense the integuments, so that they shall immediately recede on being divided by the knife. His first incision through the skin will begin a little above the upper, and be continued down to the lower end of the tumour; he will next divide to the same extent the fascia superficialis, but not with the same boldness and freedom that he had used with the skin; he will pinch up with his fingers or forceps, a small portion of it, and make a small hole in this raised portion, by cutting it horizontally; he will then introduce a director into the opening, on which he divides the fascia, first to the upper end

External incision.

Division of fascia superficialis.

of the external incision, and then changing the direction of the instrument down to the lower end of the tumor. Should any considerable hæmorrage occur, from the division of any branch of the external pudendal artery, it should now be stopped by pressure with the fingers of an assistant, or secured by a ligature.

Hæmorrhage from pudendal artery ſtopped.

In the same manner as he had divided the superficial fascia, will he divide the cremaster muscle, and then that cellular membrane, in which the hernial sac had formerly lain loose, but which now serves to connect it closely to the surrounding parts, and apparently to constitute a part of the protruded peritoneum, adding in some instances considerably to its thickness, and in others but very slightly. All those parts which remain to be cut after the division of the cremaster, should be first opened at the inferior part of the tumor, as this is the most safe spot for opening the sac, and as the operator cannot be positive what depth, or how many layers of parts he will have to divide before he penetrates the sac.

Diviſion of Cremaster.

How to cut the parts which lie under the cremaſter.

Having come to what he conceives to be the sac, he will now cautiously pinch a portion of it in his fingers, and rub them on each other, to be certain that none of the intestine intervene. Having cut horizontally the raised portion, so as to make an opening into the sac, large enough to admit the director, he will pass this into the sac and up towards the ring, taking care always to keep every part of the groove applied as closely as possible to

To open the Sac.

Caution in introducing the director.

the inner surface of the sac, lest any portion of intestine should unfortunately insinuate itself between them and be wounded by the knife. With the probe-pointed knife introduced on the director, he will enlarge the opening in the sac, so that he can introduce his fore finger, and using this as a director he will divide the sac up towards the ring. He now searches for the external ring, which will be obscured by that small thin tendon, which is stretched between its two pillars, and spread down on the chord to a short distance, this being cautiously divided, the pillars of the ring become apparent; Mr. Cooper, whose authority should have the greatest weight, advises 'that the sac should not be divided, higher than to an inch below the abdominal ring, as its division near the abdomen makes the wound more difficult to be closed, and exposes the patient to greater danger of peritoneal inflammation.'

External ring concealed.

Sac not to be divided up to the ring.

If the stricture be owing to the pressure of the tendinous columns which form the external abdominal ring, it is then to be divided in the following manner; the Surgeon passes his finger into the sac as far as the stricture and then conveys a probe pointed bistoury on the forepart of the sac, and insinuating it within the ring, cuts through it, in a direction upwards, opposite to the middle of the sac, and to an extent proportioned to the size of the tumor.

How to divide the stricture when in the external ring.

'The dilatation of the ring should not be larger than sufficient to return the protruded parts, but it

Extent of division of external ring.

should allow them to pass without committing any violence by the pressure exerted in effecting their return. In general, if the finger can be readily admitted into the abdomen by the side of the protruded parts, the dilatation is sufficiently free.'

'It is best to divide the stricture by passing the knife between the ring and the sac, as a larger portion of the Peritoneum is thus left uncut, and the cavity of the abdomen is afterwards more easily closed.'

Stricture at the internal ring.

Sometimes however the stricture is not made by the borders of the external abdominal ring, but is seated at the internal ring, where the pressure is made on the protruded viscera by the border of the tendon of the transversalis muscle above, and by the edge of the opening in the fascia transversalis below. In this case Mr. Cooper directs us to act thus, 'The Surgeon passes his finger up the sac, 'towards the abdominal ring, until he meets with 'the stricture, he then introduces the probe pointed 'bistoury with its flat side towards the finger, but 'anterior to the sac and between it and the abdomi'nal ring, his finger being still a director to the 'knife. Thus he carries the knife along the fore'part of the sac, until he insinuates it under the 'stricture formed by the lower edge of the trans'versalis, and internal oblique muscles, and then 'turning the edge of the knife forwards by a gentle 'motion of its handle, he divides the stricture suffi'ciently to allow the finger to slip into the abdomen

How to be divided.

‘ the knife is then to be withdrawn with its flat side ‘ towards the finger as it was introduced, to prevent ‘ any unnecessary injury of the parts.’

Advantage of this line of incision.

‘ The direction in which this orifice is divided ‘ is straight upwards opposite the middle of the ‘ mouth of the sac, as in this way the Epigastric ‘ Artery can scarcely be cut, whatever be its rela‘ tive situation with respect to the sac.

‘ An advantage is derived from dilating the stric‘ ture without cutting the sac itself, for there is no ‘ danger of injuring the intestine with the naked ‘ edge of the knife.’

It has been objected to this proposal of Mr. Cooper's, that to effect it the operator should possess a more than common share of dexterity combined with a familiar knowledge of the anatomy of the parts, engaged in this disease; that the intimate connexion which is formed between the sac and the surrounding parts, must render the attempt not only very difficult, but extremely dangerous when made by men less conversant with anatomy and less practiced in the operation.

Stricture made by neck of sac. How discovered.

Sometimes the stricture is seated in the neck of the Hernial sac; this will be known by the dilatation of the transversalis being insufficient to liberate the intestine, and when this is found to be the case, the same direction must be given to the incision; this operation differing from the foregoing only in this circumstance, that now the knife must be carried along the finger, within the sac, and being passed

Operation in this case.

into the stricture must be turned, so as to present its cutting edge to the anterior part of the stricture, which can now be readily divided by gently moving the handle of the knife forwards and upwards opposite to the middle of the anterior part of the sac.

It has been already mentioned that the division of the parts which form the stricture, should not be to a greater extent than is necessary for the easy return of the protruded bowels; and that, in general, when the finger can be readily passed into the abdomen by the side of the protruded parts, the dilatation is sufficiently free. Yet something more than the free division of the stricture is necessary to obtain the easy and safe return of the viscera, when a large fold of the Intestine is down; for I have, on more occasions than one, seen the operator embarrassed, by the unexpected difficulty and delay, which he has experienced in this step of the operation. I have seen him use a degree of pressure unnecessarily severe, and decidedly injurious. Nay, I have seen him enlarge the incisions which were already sufficiently free; conceiving that the difficulties he encountered could only have arisen from a stricture of the surrounding parts, I have seen him, I say, after all this delay, embarrassment and unnecessary violence, resign the task to one of his assistants, whose suggestions, but a few minutes before, he had disdained to receive. Now all these difficulties are occasioned by the readiness, with which the portion of intestine just pushed up, is

Difficulty of returning the bowels into the abdomen.

forced out again from the cavity of the abdomen. You can see the operator, obviously push up a portion of the gut; this he effects with readiness, but the moment he withdraws his fingers from the cavity, you see a portion of the bowel again to descend; whether forced out by the muscular exertion of the walls of the cavity, or by the elasticity of the air confined in the intestinal tube—again he pushes up the same, or another portion, and again the same disappointment occurs. Now all this is to be obviated by attention to this single and simple rule: push up the gut nearest to the ring, assuring yourself that it has entered the cavity of the Abdomen, by passing in your finger along with it, retain this portion by holding your finger on it, until, with those of the other hand, you have pushed up a second portion; and in this way, support each part as you return it, until the whole be replaced.

Rule for guarding againſt this difficulty.

We sometimes, though rarely meet with a variety of this kind of Inguinal Hernia, differing from that already described, chiefly in this circumstance; that it has not passed through the external ring, but lies immediately under the tendon of the external oblique muscle.

A variety of Inguinal Hernia.

The appearance of this variety of Hernia, is as a fulness, stretching from the site of the internal ring along the inguinal canal, down to the vicinity of the external ring; this will be increased by coughing, sneezing or any violent action of the

Appearances of it.

abdominal muscles. The relative position of this to the neighbouring parts is precisely the same as that of the more ordinary form of the disease, with this single exception, that it has not passed through the ring, but remains under the tendon of the external abdominal muscle.

Relative position of the parts.

The anatomy of this variety of the disease indicates the same rules for the Taxis, and for the operation as apply to the ordinary form of Inguinal Hernia, only, that here you must divide the tendon which covers the tumor, making a small opening into it by pinching it up and cutting it horizontally; into this opening introduce a director, by which you will be enabled to divide so much of the tendon as is necessary to bring the tumor fully into view. The manner of opening the Sac is the same as that already described. The arched edges of the internal oblique and transversalis muscles are then to be divided directly upwards.

Rules for the operation.

While the more common species of Inguinal Hernia escapes from the abdomen by the same aperture at which the spermatic chord begins to pass through the walls of this cavity, another, and less frequent species, forces through those parts which constitute the thickness of the walls, immediately behind the external abdominal ring; this may be termed the Direct Descent. This form of Hernia, however, is very rare, owing to the position of the external abdominal ring, and to the parts placed directly behind it. We observe that this opening is not

Another species of Hernia.

The direct descent.

Why so rare.

only bounded below, but is partly occupied, by the portion of the pubis between the spine and angle of this bone; towards the linea alba, it is bounded by the edge of the rectus muscle. The wall of the abdomen immediately behind this ring, consists of the conjoined tendons of the transversalis, and internal oblique muscles, and of the transversalis fascia, the natural strength of which, at this spot, is increased by their attachment to the crest of the Pubis, and by the connection which the outer edge of the rectus has with the fascia transversalis. An additional security is derived from two small but strong fasciæ, between which the chord passes; one of these is the fascia, so often mentioned, which stretching from one pillar of the ring to the other, fills up all that part of it which is above the spermatic chord. The other, is a strong triangular fascia, arising by a pretty broad base from the crest of the pubis, anteriorly to the insertion of the internal oblique and transversalis tendons, passing immediately behind the external abdominal muscle, until it reaches the linea alba, in which it terminates by a narrow point about one inch and a-half above the pubis. The edge of this fascia which looks towards the spermatic chord, is slightly grooved or hollowed out. When the abdominal muscles, and linea alba are stretched, that edge of this ligament is seen to rise up from the pubis, and consequently to shut up a greater portion of the external ring. Another advantage derived from this ligament is, that it strengthens the insertion of the tendons of the internal oblique and transversalis into the pubis. This fascia is delineated, but not marked in plate 1st of Mr. Astley's, Cooper's Treatise on Inguinal Hernia, nor is it noticed in his description.

Appearances of this species.

Relative position.

In appearance, this species differs from common Inguinal Hernia, by being situated nearer to the Penis; its relative position to the neighbouring parts, also differs from what takes place in the common form of Bubonocele. For as the Epigastric Artery lies to the outer or iliac side of the external ring, and as this Hernia pushes down directly through this aperture, the artery must lie on the outer or iliac side of such Hernia. Again, the spermatic chord, at the external ring, is seen covered by the cremaster muscle, and lying close to the outer side of the Hernia, but from the place of this aperture, these parts are receeding from each other, the Chord passing outwards and upwards, while the Hernia passes directly upwards into the cavity of the abdomen. In this species of Hernia, the attempt at reduction should be made by directing the pressure upwards and a little inwards. The operation by the knife, when necessary, is to be performed, as for the ordinary form of bubonocele, with this additional motive of proceeding with caution, that here the Hernial Sac is not covered by the cremaster muscle, and therefore the operator will have so much the less depth of parts to cut through before he reaches the Hernial Sac.

Of Epigastric artery.

Of Cremaster.

Taxis in this specie.

Extraordinary caution in operation required.

HERNIA CONGENITA.

This species differs from common Inguinal Hernia, in this circumstance, that it occurs while the communication yet remains open between the Peritoneum lining the abdomen, and the production of this membrane which descends into the Scrotum, to constitute the Tunica Vaginalis. Hence we find that the bowels do not push down before them a Hernial Sac, but fall into this open process of Peritoneum which surrounds the testicle in the Scrotum, and consequently the protruded bowels are found in contact with the Testicle.

Peculiarity of Hernia Congenita.

The Anatomy of Congenital is nearly the same with that of the ordinary species of Inguinal Hernia. The Spermatic Chord, always lies behind the Hernial Sac. The Testicle, involved in the contents of the Hernia, cannot be clearly distinguished. This species of Hernia is particularly liable to be mistaken for Hydrocele; being sometimes combined with a quantity of water, which, falling from the Abdomen, into the lower part of the tumor, renders it transparent, and gives the idea of the whole being an Hydrocele.

Anatomy of Hernia Congenita.

Liable to be mistaken for Hydrocele.

This complication of disease, may be known by returning the whole contents into the cavity of the Abdomen, when the patient is in a horizontal posture; then putting the finger against the abdo-

How to be distinguished.

minal ring, the water will slip by it, and fall down into the Scrotum, producing a transparent tumor, or true Hydrocele; after which, if the pressure of the finger be a little lessened at the ring, and the patient desired to cough, the Intestine, and Omentum, will be felt falling down into their former situation.

This Test not always applicable.

This mode of discriminating, however, cannot be employed when an adhesion exists between the testicle and the contents of the Hernia. The mode of effecting the Taxis, and of performing the operation, is the same as that for ordinary Inguinal Hernia; with this exception, that so much of the tunica vaginalis should be left unopened, as will be sufficient to cover the testicle completely.

Peculiarity in the operation.

Having treated of the Anatomy of Inguinal Hernia, the kind of rupture most frequent in males, I shall now proceed to the Anatomy of Crural Hernia, to which females principally are liable.

ANATOMY OF FEMORAL HERNIA.

Difficulty of the subject.

I have too frequently had occasion to remark how much Surgical Students complain of the difficulty which they encounter, in acquiring a knowledge of the Anatomy of the parts concerned in this disease. These complaints it must be admitted, arise in some degree from the complicated structure of the parts; in some degree also from the prolixity and minuteness of detail into which those who describe newly discovered parts, almost necessarily descend. The principal and most fruitful source, however, of these difficulties, appears to be the want of a systematic plan of examining these parts, so as to obtain from a single dissection, a connected view of their several relations to this disease.

Causes of this difficulty.

The following mode of making the dissection, appears to me best calculated to attain this desirable end.

Mode of commencing the dissection.

Cut through the Abdominal Muscles and Peritoneum, by an incision extending from the spine of one Ilium to that of the other. Divide the muscles of the opposite sides by an incision through the linea alba, down to the Pubis. Turn down the Abdominal Muscles of each side, upon the top of thigh; pass your finger along the inner side of the Iliac Vein, towards the limb, and when it has reached to the Abdominal Muscles, you will feel it, entering into an opening which leads from the Abdomen to the top of the thigh. The finger cannot enter farther than half an inch, through this opening in that direction. This is the opening through which crural Herniæ pass from the cavity of the Abdomen, and at this opening only can the bowels escape to constitute this species of the disease; contrary to what happens in Inguinal Hernia, where the bowels may escape from the Abdomen, at two points, viz. either by entering the Internal abdominal ring, along with the spermatic chord, or by forcing their way through those parts which lie immediately behind the external abdominal ring. This aperture then, the only one through which Crural Hernia can protrude, is called the Crural Ring. To prevent any confusion arising from the similitude of names, observe that Pouparts ligament has occasionally been termed the Crural Arch. Before you disturb any part, study well the situation of this opening, its relation to the vessels and other important parts in its vicinity. Remark then, that the femoral vein forms the boundary of this opening, on the iliac side, observe through the peritoneum, the epigastric artery and vein running at the outer or Iliac side of this opening, and distant from it about half an inch. The spermatic chord in the male, or round ligament of the uterus in the female, enters into the internal abdominal ring, immediately on the outer side of

Crural ring.

Crural arch.

How bounded.

Vas deferens.

Umbilical Artery.

the episgastric artery. The vas deferens lies on the outer or iliac side of this opening. The umbilical artery lies nearly one inch to the pubic side of the crural ring.

How to remove the Peritoneum.

Now proceed to remove the peritoneum, in order to gain a more distinct view of those parts. For this purpose cut through this membrane by an incision commencing at the spine of the ilium and carried across the iliac muscle, and here begin to raise the peritoneum. When you come near to the spermatic chord or round ligament of the uterus, carefully separate this membrane from those parts with the knife, as its adhesion to them is particularly close. You must be careful not to raise any other membrane along with that portion of the peritoneum which lines the abdominal muscles.

How the Hernial Sac is formed.

You cannot but observe that the peritoneum, as it descends to line the pelvis, covers that opening called the crural ring; and therefore you perceive that this membrane will be pushed down by the bowels as they enter this opening, and will consequently form the peritoneal covering of such Herniary tumour. You will often find a quantity of soft fat lying on that surface from which you have removed the peritoneum. By scraping this with the handle of your knife you remove it readily and without danger of cutting any of those membranes which constitute a material part of the anatomy of crural Hernia. The Peritoneum being removed, again turn your attention to the crural ring. Pass your finger into this aperture, and press it against the border of the ring, nearest to the Symphysis pubis. You find it to present a very sharp and very firm edge. This edge has hitherto been described as formed by the third insertion of the external oblique muscle. With this opinion we can by no means agree. We must however defer to a future stage of the dissection, the objections which we have to offer against the validity of this description, and shall now proceed to point out to you that, which we conceive, to be the real structure of these parts, confirmed by repeated dissections.

Edge of ring towards the pubis sharp and firm.

But not formed by the third insertion of external oblique.

Before you detach or separate any part, examine well the appearances and structure which present themselves to your view. And first as you look at the crural ring, you see it occupied by a quantity of loose cellular substance, which in some instances assumes the appearance of a distinct membrane, and you occasionally find here one or two lymphatic glands. Pass your finger into this aperture, and press it against its inner or pubic edge. You will find this edge extremely sharp, and unyielding, while the limb is extended, and the foot turned outwards; but when the knee is bended, and the limb rolled inward, this edge is relaxed, the aperture widened, and those parts which border on the opening, and, which had been drawn down into it by the opposite position of the limb, are now seen to rise up again into the abdomen. Among the parts which undergo such change of place, the

crural ring how occupied.

Effects of different postures of the limb on crural ring.

And on the neighbouring parts.

most important are the Epigastric artery on the iliac side, and some vessels very variable in their size, and origin, which pass in no very regular course towards the Symphysis Pubis.

Aponeurosis lining the ilium and lower part of the abdomen.

Next, turn your attention to that aponeurotic expansion, which lines the hollow of the ilium, and ascends upon the internal surface of the abdominal muscles, over to the symphysis pubis, and linea alba. The texture of that portion which covers the iliac muscle, is pretty strong; that portion which lines the abdominal muscles, in this view, appears much more thin, except that part of it which stretches across the tendinous portion of the transversalis abdominis, over to the rectus. In this place the aponeurosis appears to be more strong and thick, but this, in a subsequent stage of the dissection, will be found to be a delusive appearance.

A white line visible in this aponeurosis.

Where it lies externally,

You see in this aponeurosis, a white line passing in a direction nearly from the anterior superior spine of the ilium, over to the pubic edge of the crural aperture. You may observe however, that it commences half an inch below the spine of the ilium. In subjects that have been injected you see a blood-vessel (the arteria circumflexa ilii) running in that part of this white line, which lies between the outer side of the external iliac artery, and spine of the ilium.

How it terminates internally.

This white line stretching across the anterior edge of the crural ring, passes about half an inch beyond its pubic edge towards the symphysis, and inserts itself by a very acute angle into the crest of the pubis. Before you can discover the uses, or appreciate the value of this aponeurosis, you should recollect the other means which nature has employed to prevent hernia from passing out of the cavity of the abdomen, to the top of the thigh.

How herniæ are prevented from passing out at all points on top of thigh.

The lower edge of the external abdominal muscle, called Pouparts ligament, which constitutes the lowest border of the abdominal parietes, is stretched across from the spine of the ilium to that of the pubis; between these two processes, the anterior edge of the os innominatum, is considerably though not regularly excavated; in consequence of which a considerable space intervenes between the ligament and the edge of the bone. By what parts is this interstice occupied? and by what means are we secured from Hernia occurring along every portion of it, except that which is called the crural ring?

We find that a considerable part of this hollow (from the spine of the iliam to the external iliac vessels) is occupied by the iliacus internus and psoas muscles, as they pass out of the abdomen, over the edge of the pelvis, to insert themselves into the small trochanter. These, with the crural vessels and nerves contribute to fill up this space. But still we find, that by all these parts the hollow is but imperfectly filled, that there is not only no connection between Pouparts ligament, and the surface of these muscles, but that even a considerable space intervenes between them, and that this interstice is so large as would with facility admit the

How the space between pouparts ligament and edge of os innominatum is occupied.

Not completely filled.

escape of the bowels. By the following simple expedient you may ascertain the extent of this interval without removing any of the parts from their situation. Make in the aponeurosis which covers the iliac muscle, an opening capable of admitting the finger. Pass it between the aponeurosis and surface of the muscle, and you will be enabled without much difficulty to push the finger under Pouparts ligament down to the forepart of the thigh. What it is then which leaves one particular spot alone subject to crural hernia, while all the rest of the top of the thigh is completely secured against the occurrence of this accident is an aponeurotic membrane. This membrane under different names, lines the hollow of the ilium and lower part of the abdominal muscles; anatomists in their descriptions of this aponeurosis, have assigned different names to so many different portions of this membrane, and have descended into such a minute detail of its various connexions and relations, as to have rendered the study of this piece of anatomy very difficult to the generality of pupils. I trust, therefore, that I shall stand excused, if I attempt to illustrate this description by a familiar comparison. I think then that this fascia may be said to resemble a funnel, the wide part or mouth of which occupies the hollow of the Ilium, and lower part of the abdominal muscles; and the narrow part or pipe of which passes downwards on the thigh. The mouth of

Proof of this.

The lining aponeurosis.

Its figure compared to a funnel.

this funnel may be supposed to rise as high as the upper edge of the Iliac muscle, and to be turned towards the cavity of the abdomen: the pipe joins the wide part where the external iliac vessels are passing under Pouparts ligament, and it is continued down on the thigh so low, as to reach the insertion of the Saphena, into the femoral vein. Its shape, however, differs from that of an ordinary funnel, and must be supposed to be flattened both in its body or wider part, and pipe. The different parts of this aponeurotic funnel, have received different names. That part is called iliac fascia, which covers the muscle of that name. The term, transversalis fascia, is applied to that portion which lines the transversalis muscle. The narrow prolongation which descends on the thigh, is termed the sheath of the Femoral vessels; the anterior part of which, again, is described as the transversalis portion, from its being continous with the transversalis fascia, while the term of iliac portion, is applied to the posterior part of this sheath, because it is continuous with the part called the iliac fascia.

Appellation of various parts of this funnel.

Iliac fascia.

Transversalis fascia

Sheath of the vessels

At the junction of the narrower with the broader part of the funnel, we find the connexions of this fascia to the surrounding parts to be particularly close and strong; so that where it is passing over the anterior edge of the os innominatum, it adheres very intimately to the ligamentous substance covering the crest of the pubis, and to the periosteum

Close adhesion of its neck to the surrounding parts.

of that part of the ilium on which it lies. Anteriourly, its connexion with Pouparts ligament, is not less intimate. The iliac vessels pass down within the funnel, lying on that part of it which lines the iliac muscle. When these vessels come into the narrower part of this aponeurotic funnel, they pass down, not along its centre, but towards the outer or iliac side. It is partly owing to this position, and partly to the shape of the tube (which is more flat and extended on the pubic, than the iliac side), that we see those vessels, as they are passing out of the abdomen removed to a considerable distance from the pubic side of the sheath. It is then, in the space between the Femoral vein, and pubic side of the funnel, that Crural Hernia uniformly takes place.

Crural vessels lie towards the iliac side of the sheath.

Point at which these Herniæ occur.

It may now be asked, why it is, that Femoral Herniæ do not pass down at every part of this sheath which is represented as open towards the abdomen; as it is a prolongation of that membrane which lines the lower part of the cavity? why these Herniæ do not push down along the front, or to the iliac side of those vessels? For we know, that they are constantly varying in their dimensions, and that they are compressible by a slight force, both of which circumstances should favour a protrusion of the bowels along their course. The possibility of such an occurrence, is guarded against in this manner. The external iliac vessels are covered anteriorly in the greatest part of their course, by a

Why Crural Herniæ do not occur in front of, or to Iliac side of Femoral vessels.

cellular substance only; but as they approach Pouparts ligament, they are covered in front, by a membrane of aponeurotic texture, which is reflected from their surface, and ascends to join the fascia transversalis, at a short distance above Pouparts ligament. This accessary membrane then, lining that portion of the mouth of the sheath, which is anterior to the Femoral vessels, and at the same time, stretching a little way on its iliac side, must preclude the possibility of Herniæ pushing down either in front, or on the outer side of these vessels. In addition to this, we find the mouth of the sheath still further secured; for we perceive interposed between the artery and vein, a pretty strong membranous partition, and a similar partition on the inner side of the vein. These partitions pass from the anterior, or as it has been termed, the transversalis portion, to the iliac or posterior portion of the sheath; and consequently serve not only to subdivide the wide mouth of the sheath into smaller compartments, but also to prevent it from being stretched or widened by any slight force. It is hardly necessary to remark, that the partition on the inner side of the vein, will always be interposed between this vessel and the Crural Hernia, which passes down into the unoccupied portion of the mouth of the sheath.

Further security.

The space intervening between the spine of the pubis, and neighbouring side of the Crural ring is secured by the following structure: The portion

Space between spine of pubis and

crural ring how secured.

of the fascia transvessalis which lines this space, is firmly attached to the ligamentous substance covering the crest of the pubis, and is still further strengthened by the conjoined tendon of the internal oblique and transversalis muscle. This tendon lies in close contact with the lining fascia, and it also is attached to the crest of the pubis. By the way, we may remark, that this portion of the aponeurotic funnel appears thicker and stronger than any other part of it; an appearance which is owing to its close connexion with the conjoined tendon of these muscles. Pouparts ligament, the third insertion of the external abdominal muscle, and a portion of the fascia lata of the thigh, complete the defence, against the occurrence of Hernia, in this space.

Why this portion of fascia appears thick and strong.

That you may more clearly see the structure of this part, and that you may ascertain how Crural Herniæ are circumstanced, after they have descended through the Crural ring, you should now direct your attention to the Anatomy of the upper part of the thigh; the dissection of which, you should prosecute in the following manner:—

How to proceed in the dissection.

Raise the superficial fascia, which I formerly described as passing down from the abdomen upon the forepart of the thigh. Keep the back of the knife towards the fascia lata, lest you cut away any part of it; for in some subjects, a part of this fascia lata, but little exceeds the cellular substance in density. You see the Vena Saphena major running in the hollow on the forepart of the thigh, and lying upon the surface of the fascia lata, until it arrives within an inch and a half of Pouparts ligament. Dissect this vein from the surrounding cellular substance, cut it across at the distance of two or three inches below the ligament, and turn it up towards the ilium, removing a small quantity of cellular substance, which connects the posterior surface of this vein to the fascia lata. You perceive that the vein sinks down through this fascia, in order to enter into the pubic side of the Femoral vein, which lies under it. Where the Saphena vein is passing through the fascia lata, the latter presents a well defined semilunar edge, the concavity of which looks to Pouparts ligament. You will often find a lymphatic gland at this spot, so situated, that one part of it lies below, while the other lies above the surface of this fascia. At this point, (where the Saphena dips deep, to gain the Femoral vein) we observe, that the fascia lata, which in all the lower part of the limb, had formed one general covering or sheath for the muscles of the thigh, divides into two parts. One of these closely invests the múscles which arise from the pubis, while the other covers those which lie on the iliac or outer side of the limb. The former we shall call the pubic or Pectineal portion; the latter, the outer or Iliac portion of the fascia lata.

Vena Saphena major.

How to dissect it.

Extraordinary situation of a lymphatic gland.

Fascia lata where it splits into two parts.

Position of its pubic portion.

The pubic portion is closely attached to the muscles which it covers, and as these incline deeper and deeper in a line from the pubis to the Femoral vessels, so likewise does this portion of the fascia; until it escapes from our view, by passing in behind these vessels. The outer part of the fascia lata covering the muscles on the external or Iliac side of the limb, lies above the plane of the pubic portion, especially in the vicinity of the Femoral vessels; for here, the Iliac portion will be found to pass before, while the Pubic portion passes behind them: so that from Pouparts ligament down to the place where the Saphena vein enters, the Femoral vessels are interposed between these two portions of the fascia lata. In the remainder of their course down the limb, the undivided fascia lata gives one general uniform covering to these vessels, together with the muscles.

Of its Iliac portion.

Description of the pubic portion.

Of the pubic portion, we shall merely say, that it is much more thin than the external part, that it is attached superiorly to the anterior edge of the pubis, above the origin of the pectineus muscle; that it gives a close covering to the muscles which arise from the pubis, and that inferiorly, at the joining of the Saphena with the Femoral vein, it is united to the external portion of the fascia lata, so as to constitute that aponeurotic expansion, which under the name of fascia lata, is wrapped round the muscles of the thigh.

The external portion demands more of our attention; for it will be found so intimately connected with Crural Hernia, as to have a material influence on the symptoms and treatment of the disease. Let us now examine how that portion of the fascia lata is disposed of, which lies between Pouparts ligament, and the junction of the Saphena with the Femoral vein. The upper edge of this portion of the fascia lata, is attached to Pouparts ligament, nearly along its entire extent, from the spine of the Ilium to the spine of the Pubis. The connexion thus established, is such, that when the former is stretched by the limb being extended or rolled outwards, the latter is made to describe a line convex towards the thigh; and on the contrary, when the limb is flexed or rolled inwards, the crural arch is made flaccid. It has already been stated, that the Iliac portion of the fascia lata, passes before the Femoral vessels. We observe in this part of its course, that it loses somewhat of its strength and firmness of texture; however, in general, it retains a good deal of its ligamentous nature, even when it has reached the Pubic side of these vessels; except in the immediate neighbourhood of the Vena Saphena, where it differs but little from the cellular substance. Having passed before the Femoral vessels, we find it now to descend on their pubic side; and here we see it attach itself very intimately to the pectineal fascia. This attachment is made in a straight line along the Pubic side of the vein, from

How the fascia lata is disposed of between poupart ligament and the Saphena vein.

Its connexion with pouparts ligament.

Passes before Femoral vessels.

Changes its texture;

Attaches itself to pectineal or pubic fascia.

Direction in which this attachment takes place.

the place of the insertion of the Saphena, to within a quarter of an inch of Pouparts ligament: At this place we observe, that the line of attachment is curved; and having here formed a sweep towards the pubis, that the attachment now takes place in a line across the top of the thigh.

Peculiarity of this connexion in vicinity of pouparts ligament.

The peculiar manner of this connexion deserves particular attention, and will be found to take place as follows:—

That part of the Iliac portion of the fascia lata, which runs between the Femoral vein and Symphysis of the Pubis, has its upper edge blended with Pouparts ligament, from which, as it descends to the pubic fascia, it is seen to turn upwards under Pouparts ligament, so as to touch the fascia, at a point nearer to the crest of the Pubis, than the line of Pouparts ligament. The Iliac and Pubic fascia united, then continue their course upwards, until they insert themselves into the crest of the Pubis. Observe: the place where the Iliac connects itself to the pubic portion of the fascia, is distant from the crest of the pubis, about two-eighths of an inch in the vicinity of the Femoral vein, and three-eighths in the vicinity of the Symphysis pubis. A correct knowledge of the extent and attachment of the Iliac portion of the fascia lata, is of such importance to the Surgeon, in operating for Crural Hernia, that I was unwilling to run the risque of having the description obscure, or imperfectly understood; and have, therefore, caused two

Place of this connexion.

engravings to be made, which exhibit the parts, as viewed both on the outer and inner side. From reflecting on the effects which this structure must have on Crural Hernia, I am led to propose a new mode of performing the operation, by which I am inclined to think, its object will be more easily obtained, and much of the danger attending it will be avoided. This I shall mention after I shall have finished the description of the structure.

Study of this leads to a new mode of operating for Crural Hernia.

In that portion of fascia which descends on the pubic side of the vein you may observe three or four small trunks of lymphatics with distinct masses of soft fat. Draw out these with the forceps, and cutting off each of them close to the sheath, you will perceive that each had come out through a hole in the fascia. These openings are of such dimensions as scarcely to admit the blunt end of a probe; they are not arranged in a regular line, some being situated more superficially, or nearer to the front of the thigh, whilst others are seen deep-seated, close to the surface of the pubic fascia; and in some subjects these holes are so numerous as to give a cribriform appearance to this portion of the fascia.

Should the account which I have ventured to give of the fascia lata prove correct, it will then be found, that Crural Hernia is thus circumstanced. Having descended into the Femoral sheath, it escapes through one of those apertures in it, for transmitting the lymphatic vessels, and also passes through a corresponding opening in the Iliac

How a Femoral Hernia is circumstanced.

Most frequent seat of stricture.

Falciform
border of
f. lata

portion of the fascia lata. As it passes through a small aperture in each of these parts, at nearly the same spot, it must there be liable to great constriction; for these two layers of fascia will be compressed together, and thus their strength and resistance be considerably augmented. Hence we should find the seat of stricture in strangulated Femoral Hernia, frequently to be at some distance below, and on the pubic side of the crural ring. The result of my comparatively limitted opportunities tends to strengthen this inference. For I have not yet seen any instance of strangulated Femoral Hernia, which was not liberated by a very slight division of the most superficial of those parts through which it had escaped. Now, were so much of the fascia lata wanting, as is supposed, by those who describe it to end in a falciform edge, we could not so frequently find this to be the seat of stricture. I think, that the neck or constricted part of Crural Hernia, does not always appear at the same depth from the surface; this may be readily explained, by the description I have given of the fascia lata, and is not easily reconcilable with the structure of a falciform edge.

Dissection to obtain an internal view.

Having carefully studied the structure of these parts, as viewed externally, let us next examine them as viewed internally. For this purpose, make an incision through the fascia lata, in the line of the Femoral artery, commencing about two inches below Pouparts ligament, and continuing it upwards until it divide this ligament, and the lower portion of the tendon of the external oblique. Divide this tendon by another incision, carried on to the external abdominal ring. Carefully raise the fascia lata, and Pouparts ligament, from the subjacent aponeurotic funnel; until you come to the pubic side of the Femoral vein, and lay this raised portion of the fascia lata, and of Pouparts ligament down on the adductor muscles of the thigh. A quantity of loose cellular substance, which is interposed between this fascia and the sheath, will facilitate this piece of dissection. Next, pass a pin perpendicularly through the sheath of the Femoral vessels, on the inner edge of the Femoral ring, and fix it into the bone of tbe pubis. This dissection, carefully made, will exhibit to your view, some of the most important points in the anatomy of Crural Hernia; and will serve to explain some varieties occasionally met with in this disease.

Importance of this dissection.

Extent and attachment of outer portion of fascia lata shewn.

In the first place, this view will convince you, that the Iliac portion of the fascia lata, is continued across the front of the Femoral vein, and is attached to the pubic portion of the same fascia, on the internal side of this vessel. You can see that in it are to be found, those openings which were described as serving to transmit the superficial lymphatics of the thigh into the abdomen. The curved line of its attachment to the pectineal fascia, is seen, as represented in fig. 2.

This dissection will, I trust, justify our dissent from the descriptions given of the semilunated edge of the fascia lata, by many modern Anatomists.

Whence arose the description of semilunated edge of fascia lata.

The following, I conceive, to be the circumstances which have led to the adoption of the received opinion:—

Reduced strength of this fascia.

In the first place, the fascia looses a good deal of its ligamentous texture, as it crosses the crural vessels, except in the immediate vicinity of Pouparts ligament. It is, therefore, liable to be destroyed in dissecting away the lymphatic glands. Next we find, that the pipe of the ligamentous funnel, which constitutes the sheath of the Femoral vessels, has this cressentic form on its pubic side. When the limb is extended, this sheath is put on the stretch, and not only exhibits this edge more plainly, but imparts this appearance to the superincumbent fascia lata; particularly as the firmness of its texture is here reduced: besides, it is probable, that the accounts which we have of the falciform edge of the fascia lata, were drawn from the dissections made while the limb was in a stretched state, as we know that membranous parts are more easily dissected, while kept tense

Crescentic form of sheath of femoral vessels.

Dissection made while limb was extended.

Third insertion of external oblique does not reach to the Crural ring.

By this dissection, you also ascertain positively, how small a share the third insertion of the external oblique muscle can have in producing the strangulation. You see that its attachment to the crest of the pubis, does not even extend half way between the spine of the pubis, and the inner edge of the crural ring. You observe, that it does not expand so much at its insertion into the crest of the pubis, as to reach over to the edge of the crural ring, much less does it constitute this edge itself, as a late writer describes, and delineates it. To refute this error, you have only now to examine the crural ring, from within the abdomen; and you will find it still perfect in appearance, although Pouparts ligament, and the third insertion be both thrown back upon the thigh. Nay, by passing your finger into this aperture, you will find its pubic edge as sharp, firm, and unyielding, as it had been before any of the parts were disturbed. Hence it follows, that the third insertion of the external oblique muscle, has no share in forming the pubic edge of the crural ring; that Pouparts ligament is only stretched across the forepart of this ring, and that its pubic edge is formed entirely by the ligamentous sheath of the Femoral vessels, strengthened on its outside, by the inverted portion of the fascia lata. The pubic edge of the crural ring is rendered tense, by the close adhesion of the sheath of the vessels to the ligamentous covering of the crest of the pubis, and by its connexion with the conjoined tendon of the internal oblique and transversalis muscles.

Crural ring perfect even when third insertion is removed.

How its pubic edge is rendered tense.

Before we proceed to a practical application of the results of this dissection, it may not be unsatisfactory to turn our attention to the white line which is described in page 66, as passing from the vicinity of the spine of the Ilium to that of the Pubis.

White line which has been called posterior edge of

Of crural arch.

This white line has been considered as the internal or posterior edge of Pouparts ligament. To obtain a distinct view of its structure on the iliac side of the Femoral vessels, it only requires us to cut through the fascia lata and Pouparts ligament, on the outer side of the femoral artery, and then to look on this cut edge; you will see that Pouparts ligament is intimately blended with the fascia lata, and that these two parts conjoined, or else the fascia lata singly passes upwards for nearly an inch from the line of Pouparts ligament, until it arrives at the outer surface of the fascia Iliaca, to which it attaches itself. By the attachment of this production to the fascia Iliaca, is the white line, (alluded to) formed; and in the angle of their junction the Arteria circumflexa Ilii runs.

Its outer or iliac end how formed.

Its depth.

The distance between Pouparts ligament, as viewed externally, and this portion of the white line, as seen from the inner side of the abdomen, is much greater here than where they pass across the femoral vessels. In the latter place we shall find that the distance between these two lines is very inconsiderable, the internal line being formed at this part by the junction of Pouparts ligament and the fasica transversalis. On the pubic side of the femoral vessels at the inner edge of the crural ring, this white line is caused by the fold or angle, which the fascia transversalis makes, as it is about to pass down on the thigh, to form the sheath of these vessels, and by the attachment of this fold to the ligamentous substance which

Its structure where it passes across the Femoral vessels.

Its structure on the pubic side.

covers the crest of the pubis. We shall see this portion of the white line very visibly, even after the fascia lata and Pouparts ligament have been laid down, as directed in the preceding dissection.

Diagnosis cannot be founded on examination of the tumor.

This species of Hernia is liable to strangulation, even before it can be felt externally. Hence it is obvious, that we must establish our Diagnosis principally on the preceding and concomitant symptoms of the case. Some fatal effects have resulted from mistaking strangulated Crural Hernia, for inflammation of some of those lymphatic glands, which lie in the vicinity of the Crural ring. The deep situation of the Hernia, together with its very small size, have contributed to render the mistake more frequent. In some instances the difficulty of discriminating is considerably increased, by an enlarged lymphatic gland lying anterior to a very small Hernia.

Crural Hernia mistaken for inflamed lymphatic gland.

Psoas Abscess, how to be distinguished from Crural Hernia.

I have known Psoas abscess, mistaken for Crural Hernia; but, in my opinion, these diseases may be readily distinguished from each other. The Abscess is, in almost every instance, preceded by pain of the loins; the tumour cannot be entirely returned into the abdomen, by any degree of pressure, applied even when the patient is in the recumbent posture. A fluctuation too, is often to be felt. But there is one circumstance which will, in every instance, distinguish Psoas Abscess from Crural Hernia. In the former, a fullness, and sometimes a fluctuation is to be felt above Pouparts ligament, within the abdomen, stretching towards the spine of the Ilium, and obviously communicating with the tumour on the thigh. Whereas, in Crural Hernia, no swelling or fullness is perceptible within the abdomen. Even in those cases where the Hernia rises over Pouparts ligament, the tumor is not only easily ascertained to be merely superficial, but can actually be drawn down below this ligament, upon the forepart of the thigh. To which we may add, that when Psoas Abscess passes down upon the forepart of the thigh, the tumor is, even on its first appearance, of a larger size, than what the Crural Hernia ordinarily arrives at.

How to be distinguished from varicose state of Femoral vein.

A varicose state of the Crural vein, possibly of the Saphena, at its insertion into the Femoral vein, might be mistaken for Crural Hernia. The distinguishing characters are, a varicose state of the veins of the lower extremity, and the re-production of the tumor when we press on the vein above the Crural arch, even though the patient be placed in a recumbent posture.

Fatty tumors occupy the seat of Crural Hernia.

Fatty tumors are not unfrequently found, on dissection, occupying the exact situation of Crural Hernia. I have not had an opportunity of seeing any case of this kind in the living body; but have had occasion to remark at least, five or six instances of it every season, in the dissecting-room; from which, I presume, that such tumors are more common than is generally suspected. In all those instances, the fatty tumor was connected with, or rather seemed to grow from the outer surface of the peritoneum lining the Crural ring; and the inner surface of this membrane, when viewed from the abdomen, had a contracted, wrinkled, and thickened appearance, resembling very closely the appearance of a reduced Hernial Sac. Whether the peritoneum had been protruded in these instances, I cannot pretend to say; nor can I venture to lay down the symptoms which should guide us in our Diagnosis in the living body. This much at least is obvious; that these steatomatous tumors will not be accompanied by symptoms of strangulation.

Crural mistaken for Inguinal Hernia

I have known Surgeons much divided in opinion whether a Hernia was of the Inguinal or Crural species. However, I fancy, that this point can in general be settled by the two following marks. First, the neck of the Inguinal Hernia, is situated above the tuberosity of the pubis, while the neck of the Crural Hernia is situated below it, and lies to its outer side. Secondly, if the tumor be drawn down upon the thigh in Crural Hernia, Pouparts ligament can be traced lying above its neck

An intimate knowledge of the Anatomy of the parts concerned, is more necessary to guide our practice in Crural Hernia, than in any other form of the disease. The narrow opening at which the bowels ultimately portrude; the firm and sharp edge of this aperture; the great depth from the surface at which the Crural ring is placed; the superficial situation to which the fundus of the tumor often rises, must all conspire to render the practice difficult in the hands of the best informed Anatomists, and most dexterous Surgeons; and must considerably add to the dangers arising from the errors of the ignorant, and the attempts of the awkward. When we proceed to the Taxis the patient should be placed in the same position, as was directed for this operation in Inguinal Hernia. Particular attention should be paid to keep the knee of the affected side turned inwards, in order that the fasciæ may all be completely relaxed, especially that part of the transversalis fascia, constituting the pubic edge of the crural ring. The Surgeon should now endeavour to bring the entire tumor (whether its fundus be lying upon the abdomen, or across the top of the thigh) into the hollow, or groove, on the forepart of the limb. He should recollect, that the edge of the os pubis constitutes one-third of the circumference of the crural ring, He should now, therefore, press the tumor backwards, as if to sink it into the thigh. When he thinks that the tumor is pressed so far back, as to lie on a line with this opening, he should then attempt to push it up into the cavity of the abdomen, having previously endeavoured to compress the neck of the Hernia into as small a compass as possible. The intestine should not be pushed directly upwards towards the abdomen,

Position of the patient

How the Surgeon is to proceed.

Why the intestine should be

because in this direction, it might encounter the pubic edge of the crural ring, which is very tense and unyielding. By directing the pressure on the intestine upwards, and slightly out towards the spine of the ilium, we shall avoid the resistance, which this pubic edge of the ring might offer to the return of the intestine.

Pushed upwards and outwards.

But the best directed efforts to effect the taxis, too frequently fail of success, and the operation by the knife then becomes indispensably necessary.

The stricture in Crural Hernia, will be found in one of the three following situations:—

Three seats of stricture.

First, in the opening by which it passes through the Crural sheath, and that portion of the fascia lata, which covers its pubic side.

Secondly, (as it said) in the posterior edge of the Crural arch.

Thirdly, in the mouth of the Hernial sac.

As the operator cannot previously discover, in which of these parts the stricture is formed, it must obviously be of great importance, to adopt that line of proceeding which shall enable him to divide each and all of them, with the least possible risque to those important parts, which lie in the vicinity of the deepest stricture.

Mr. Cooper recommends, that in performing this operation "The incision should be begun an inch and a half above the Crural arch, in a line with the middle of the tumor, and extended downwards to the centre of the tumor, below the arch.

Operation by Mr. Cooper.

External incision.

A second incision, nearly at right angles with the first, is next made; so that the two incisions will represent the letter T, reversed. He has seen great difficulties occur, where only a longitudinal incision of the superincumbent parts was made; the Surgeon not enjoying a view of the parts, in the progress of his operation. The superficial fascia, if it had not been previously divided by the incision through the integuments, is now to be divided. A second fascia, the fascia propria, is sometimes found interposed between the superficial fascia and Hernial sac, and must be also divided. The Hernial sac is to be opened in the same cautious manner, as recommended in the operation for Inguinal Hernia. The stricture is now to be divided by passing the finger into the sac, keeping it close against it on its anterior part. On the finger a probe-pointed Bistoury is to be introduced, and the sheath to be divided as high up as the anterior edge of Pouparts ligament. This division if seconded by a favourable position of the limb, is very frequently sufficient for the reduction of the Hernia.

Fascia propria sometimes met with distinct.

Division of the stricture.

If, however, the intestine when slightly compressed, cannot be easily returned; the finger must be passed at least half an inch higher; and then the posterior edge of the crural arch, and the fascia that covers it, will be felt forming a sharp edge, strongly compressing the mouth of the Hernial sac. To divide this edge, the knife must be carried

Stricture formed by posterior edge of Crural arch.

within the stricture, and being inclined obliquely inward and upwards, at right angles with the crural arch, a cut may be very safely made in that direction, sufficient for the purpose of liberating the intestine from pressure. By the same incision, any stricture arising from the contraction of the sac itself, will be removed." How to be divided. Stricture by the sac divided.

Having thus described the most approved mode of practice, I shall now venture to propose a method of performing the operation for strangulated Crural Hernia, different from any hitherto described. I must, however, premise that it is founded *solely* on the anatomy of the parts concerned. For, since I first conceived the idea of this mode of operating, I have not had an opportunity of putting it into practice on the living body. New mode of operating proposed. Founded only on the anatomy of the parts.

Let the patient be placed on a table, with his legs hanging over its edge, his body lying horizontally, and his shoulders a little raised. Posture of patient.

Divide the integuments by an incision on the pubic side of the Femoral vein, parallel and close to it; let this incision extend from an inch and a half above Pouparts ligament, to an inch and a half below it. Parallel to Pouparts ligament, but about half an inch below it, make a transverse division of the integuments, extending from the first incision to the spine of the pubis. Separate the upper flap, and turn it up on the abdomen. Next divide the fascia superficialis by similar External incisions.

Advantage of these external incisions

incisions. Thus you will gain a clear view of the Hernial sac, of the place at which it protrudes through the sheath of the Femoral vessels, and corresponding part of the fascia lata; and also of Pouparts ligament, and of the line along which the adhesion between the pectineal and iliac portion of this fascia takes place. Having opened the Hernial sac, in that cautious manner, recommended by Mr. Cooper; now proceed to divide the stricture. To effect this, introduce a director into the opening which you have made in the sac, and on it pass a probe-pointed Bistoury, and then divide this, the most superficial seat of the stricture, as high up as Pouparts ligament, but in a direction towards the spine of the pubis.

How to divide the first seat of stricture.

Draw down the intestine before you return it.

In this form of Hernia, it is particularly necessary that you draw down the intestine, for the purpose of examining the strictured part; as it is so very liable to be injured by the close constriction which it has suffered. When the bowels are in a proper state, proceed to return them, in the same direction as recommended for the reduction by the taxis.

If, after the division of the first aperture, you find the strangulation still to exist, you must proceed to relax the tension of Pouparts ligament. This you may effectually accomplish; and yet, not allow your instruments to enter into the cavity of the Abdomen. Recollect, that the portion of fascia, called fascia transversalis, lines this cavity within Pouparts ligament; and that this fascia is attached to the crest of the pubis; recollect also, that the inflected part of the Iliac portion of the fascia lata, is connected to the pectineal portion, at the distance of two-eighths, and even of three-eights of an inch below this ridge of the bone.

Hence you see the practicability of dividing the latter, and yet leaving the former attachment unhurt. To accomplish this, introduce the director without the sac on its pubic side. Pass the knife on this, with its edge towards the pubis, until its point has entered about one-eighth of an inch within this attachment. Then keeping the flat side of the knife, as close as possible to the surface of the muscles, and carrying it on towards the pubis; divide this attachment to whatever extent you may judge necessary. This incision, even though it should not have been carried on so far towards the spine of the pubis, as to reach to the third insertion, will yet serve most materially to relax Pouparts ligament. For the connexion between this ligament and the fascia lata is such, that a division of the one will render the other flacid, as may be understood, from what we have mentioned already. But should the stricture be such, as to require the most complete relaxation of Pouparts ligament—this can be obtained with the greatest facility. For you have only to carry on the knife still nearer to the spine of the pubis, than midway between it and the Femoral vein. In this

How to remove the tension of Pouparts ligament without entering the cavity of abdomen.

Even though third insertion of external oblique be not divided.

How to cut the 3d insertion

step of the operation, in dividing the parts from the pubic side of the Hernia, towards the spine of the pubis, you do not run the risk of wounding any important part unnecessarily; provided only that you be cautious, not to introduce your knife deeper than one-eighth of an inch within the external surface of this attachment. This can with tolerable certainty be avoided, because you have this surface fully exposed to your view, by the previous steps of the operation. If you should not be able to return the bowels after the division of these parts, you must infer, that the stricture is seated in the neck of the Hernial sac. You must therefore, now introduce a director into the sac, and pass it up within its neck. On this, you introduce a probe-pointed Bistoury, taking care not to pass it unnecessarily deep, lest you should injure any of the viscera in the abdomen. As the knife enters within the neck of the sac, you are sensible of a certain resistance being surmounted; and this resistance is occasioned by the constricted neck of the sac. With the edge of the knife directed towards the pubis, you now make the slightest division of the stricture. The extent to which this incision is required to reach, is so very trifling, as not at all to endanger the obturator artery, even when, in consequence of its unusual origin, it chances to pass close to the Crural ring.

Caution to be observed

Stricture in the neck of the sac.

How to be divided.

It has been urged against the plan of dividing the parts towards the symphysis pubis; that in order to obtain a view of the seat of stricture, the intestine (which in Crural Hernia descends inwards) must be drawn considerably to the outer side, and that thus it is stretched at the strictured part, and readily tears through. To this it may be replied, That when a considerable quantity of intestine is down, this suddenly expands as soon as the Hernial sac is opened, and conceals the first seat of stricture from our view. For this reason, the intestines require to be gently compressed, or drawn aside, before we can pass a director or knife, with safety into the sac. I have never observed, that the intestine lay particularly over the internal or pubic side of the stricture; and therefore, I conceive, that the director or knife, can be introduced within the seat of the stricture, as readily towards the pubic side, as in any other direction. My observations would justify me in asserting, that in those cases, where the volume of intestines suddenly expands on opening the sac, they mount up on the abdomen, and therefore tend to increase the difficulty of introducing an instrument, rather on the anterior, than on the inner side of the stricture.—Another objection which has been urged, is, that the difficulty of the operation is much increased: for when the incision is to be made inwards, the knife must be buried so deep, as to be entirely concealed by the surrounding parts.

To this I answer, that by making the division of the integuments, and superficial fascia, and raising the upper flap in the manner I have ventured to recommend, you will be enabled to obtain a clear and satisfactory view of the opening in the fascia lata, through which the Hernia escapes to the surface, viz. of the most superficial seat of the stricture. You will have a distinct view of the fascia lata, which descends from Pouparts ligament to the pectineal fascia. This is next to be divided, whenever you find that a division of the first seat of the stricture, has not liberated the intestine. I conceive that the opportunity afforded, of having in your view, the parts which are to be divided, constitutes one very material advantage in this mode of performing the operation. A third objection made to the incision inwards, directed by Gimbernat, does not apply to the method recommended above. The objection is, that the intestine is liable to be wounded, in passing the knife into the mouth of the sac, or still higher into the abdomen. This objection lies against every mode of operating, in which it is required to pass the knife deeply into the sac, before the more superficial seats of the constriction have been set free. The proposed operation seems calculated to guard effectually against such an accident, because the division of the parts is made successively from without inwards.

Fourthly, It is objected to the division inwards, that where the Hernia is large, sufficient room cannot be gained for the return of the protruded bowels.

This objection, as far as my information goes, has not been supported by a single fact. For I have never seen or heard of any instance where the operator was obliged, after the division of the parts inwards, to have recourse to the division of the parts behind the crural arch. The anatomy of the parts, and the result of the operations on the dead body, would lead me to expect, that even in the largest Crural Hernia, very sufficient room may be gained for the return of the bowels by the proposed method of operating.

This differs from Gimbernat's operation.

It is scarcely necessary to add, that this proposal differs very essentially from the operation advised by Gimbernat. For, according to his directions, the deeper seated and superficial parts are all to be divided by one and the same motion of the knife. Besides, it is proposed by him, to introduce the knife into the cavity of the abdomen; by which the intestines are very liable to be wounded, and the obturator artery, when it runs on the pubic side of the Crural ring, must inevitably be divided.

ANATOMY OF UMBILICAL HERNIA.

Examination of Umbilicus in the fœtus necessary.

IT is only by examining the Umbilicus of the fœtus, that we can obtain a clear idea of its anatomical structure in the adult. In the former, the vessels which pass through this opening are large and pervious; in the latter, they become impervious, and shrink into thin chords. In the fœtus too, the skin is prolonged upon the chord, beyond the surface of the abdomen, while in the adult it is inverted, and so closely connected to the remains of the vessels, as to render the examination difficult and unsatisfactory. For this reason, we shall proceed to examine the structure of the umbilicus in the fœtal state.

Anatomy of the Umbilicus in the fœtus,

The skin of the abdomen is continued along the chord, and terminates by an irregularly indented edge; its length in different points of the circumference of the chord, varies from half an inch to nearly an inch.

The dense white membrane which envelopes the chord beyond this edge, appears to be continuous with the cuticle of the integuments. The integuments can easily be separated from the vessels, being connected to them only by a loose cellular substance. On cutting through the abdominal muscles near the ribs, laying them down on the pubis, and detaching the peritoneum, the umbilical vein is seen of such a size, that it alone occupies as much of the aperture of the umbilicus, as the two Umbilical arteries and urachus conjointly. A slight membranous septum separating the vein from the other vessels, seems to divide the opening into two. The edges of this opening are distinctly tendinous, not sharp. With this edge the arteries and urachus appear to have more connexion than the vein has. By drawing the Umbilical vein upwards, or the arteries downwards; the teguments of the fœtus present an appearance exactly similar to that of the adult navel. And thus it appears, that the shrinking of the vessels, as soon as they cease to transmit blood, will cause the retraction of the skin of the navel.

How the retraction of skin of navel is caused.

All the chord which is anterior to the portion covered by the integuments of the abdomen, will shrink and fall off by mortification, while the skin inverted, will adhere to the remaining extremities of the vessels, provided the ligature be not applied on the portion of the chord covered by the skin. Is it then a matter of such consequence, as accoucheurs suppose, to fix the precise point at which the Umbilical chord of the fœtus should be tied ?

In what umbilical differs from inguinal ring.

From the preceding description, it is obvious, that the opening in the linea alba, which is termed umbilicus, differs from those openings termed the Inguinal rings, particularly in this circumstance; that here the different layers of the abdominal muscles being consolidated into one, the aperture is made through all at the same point: therefore this opening is direct, and consequently this is the weakest point of the abdominal walls.

Why Herniæ of Umbilicus not more frequent.

Protrusions of the bowels, however, do not occur here so frequently as they do at the groin, probably because the action of the diaphragm, does not affect this higher part so much as it does the lower part of the abdomen. Hence it is, that the Umbilical Herniæ, are more generally produced by an increased bulk of the contents of this cavity, than by violent exertions. The adhesion of the inflected skin, to the remains of the umbilical vessels being very close, will, together with the ligamentous remains of these vessels, give greater strength to the centre of this aperture; while the space intervening between the borders of this opening, and the ends of these vessels, being occupied only by cellular substance, will more readily yield to the distending cause. Hence the mouth of an Umbilical Hernia, seldom occupies the centre of the Umbilicus. As all the umbilical vessels had originally lain between the peritoneum and abdominal muscles, it is obvious, that there never was

Why the Hernia seldom protrudes at the centre of umbilicus.

Umbilical Herniæ must have

an aperture in this membrane for transmitting these vessels; and consequently, that the peritoneum is as perfect at the umbilicus, as at any other point. When Herniæ then occur at this opening, they must push before them the peritoneum, and must, like all other Herniæ, be covered by a peritoneal sac.

peritoneal sac.

Appearances of Umbilical Herniæ.

This Hernia appears in fat persons, as a flat broad swelling, the boundaries of which, cannot be distinctly ascertained. In those of an opposite habit, the tumor assumes a pyriform shape, and is distinctly circumscribed. The contents of this species of Hernia, are sometimes omentum only, more frequently omentum and a portion of intestine; but there is scarcely any instance in which the omentum does not form a part.

Contents of Umbilical Hernia.

Taxis.

In attempting the reduction of this Hernia, the abdominal muscles should be relaxed, and the tumor should be pushed backwards, and a little upwards, as the opening through which the bowels have passed, is generally situated above the centre of the umbilicus. We cannot be surprised that this species of Hernia should so frequently be irreducible, without strangulation, when we recollect that a part of its contents so generally consists of omentum. This, by its adhesion, or by morbid alteration of its texture, becomes incapable of being returned into the abdomen. The seat of constriction in this species of Hernia, when stran-

Why so frequently irreducible

gulated, is in the edges of the umbilicus, or in the neck of the sac, which is occasionally much thickened. There is this peculiarity in Umbilical Hernia, that some instances have occurred, in which the peritoneal sac was wanting, either entirely, or in part. Whether this was caused by the rupture, or by the absorption of this membrane, I cannot pretend to determine. The sac, when present, is seldom found thickened, except at its neck. The parts which cover the sac, are also generally thin. Hence we see the great caution necessary to be observed, in performing the operation for strangulated Umbilical Hernia, lest the intestine should be wounded, even by the first incision. There is not any thing in the anatomy of those parts, to prevent our making the division of the stricture, either upwards or downwards. We should, however, bear in mind this important fact, that an adhesion of the intestine to the peritoneum, within the abdomen, often occurs. The intestine is therefore, in great danger of being wounded, unless the finger be introduced before the knife, during the division of the stricture. Should the omentum be so altered in texture, as to render its reduction inexpedient, it should be cut off. I have seen tedious and profuse discharges, which even endangered the life of the patient, to follow, in cases where a contrary practice had been adopted.

Pecularity of Umbilical Hernia.

Sac and integuments generally thin.

Caution in making first incision.

Division of stricture either upwards or downwards.

Adhesion of intestine to peritoneum frequent.

Omentum how to be treated.

ANATOMY OF THE ABDOMEN.

THIS cavity is bounded superiorly by the diaphragm, inferiorly by the levatores ani, anteriorly by the abdominal muscles, and posteriorly by the lumbar vertebræ, and os sacrum.

Boundaries of this cavity.

The shape of this cavity varies considerably with the various postures of the body, and is also different at different periods of life; circumstances which should be held in recollection, when we examine it externally, to feel whether the contained viscera be in a sound or morbid state. For instance, when we stand erect, the lumbar vertebræ form a convexity, which projects into this cavity; the lowest region of the abdomen becomes more prominent: the superior aperture of the pelvis is turned forward; the os sacrum is turned upwards and backwards; and the acetabula are drawn downwards. These alterations in the form of its walls, are accompanied by some, tho' less marked alterations, in the position of its different viscera. The liver and spleen, are found to descend somewhat lower, when the body is in an erect, than when in a horizontal posture. When we lie on either side, the lumbar vertebræ form an arch, the

Shape varies at different ages and in different postures.

This change of shape produces change in the position of the abdominal viscera.

Lumbar vertebræ,

how affected by posture.

convexity of which looks downwards, and the concavity upwards, so that the false ribs of the lower side, are removed further from the crest of the ilium, while those of the upper side are made to approach it. Hence it follows, that those patients who labour under a lateral curvature of the lumbar vertebræ, should be directed to lie on that side of the body towards which the hollow of this curve is situated.

Practical inference in curvatures of the vertebræ.

Capacity of this cavity at different periods of life.

The Cavity too, of the abdomen, varies much in the different periods of life. In young infants, it is proportionably greater than in adults. The space between the sternum and the pelvis, is in the former about one-third, but in the latter, scarcely one-fifth of the length of the body. This excess in the capacity of the abdomen of infants, is found principally in the Umbilical region, which is not only longer but larger in every direction. It is deeper from before backwards, because the vertebral column is, at this age, almost straight; it is wider from side to side, because infants have their ribs turned more outwardly. The pelvis is very small, not being yet developed. The arches formed by the alæ of the diaphragm, are proportionably less deep, than in adults. We should not, therefore, consider a prominence and fullness of the Umbilical region in young children, as a mark of disease.

Proportionably larger in children.

The excess greater in umbilical region.

Practical inference.

Situation of the abdominal viscera in children.

The Situation of the abdominal viscera, is also different from what we find in the adults. The stomach, instead of being placed transversly, lies almost perpendicularly, descending into the umbilical region. The omentum is consequently placed more to the left side of the cavity. The liver lies very much in the middle region of the abdomen, being proportionably much larger than in the adult, and not having the deep concavity in the right ala of the diaphragm, which exists at a more mature age. The spleen too, is to be felt at this early period of life, below the false ribs. The uterine organs in females, and the bladder in both sexes, rise up nearly to the umbilicus.

No vacant space in the abdomen.

How extravasations of blood are confined to the vicinity of wounded vessel.

This effusion not attended by fluctuation.

The parietes of the abdomen possess the power of accommodating themselves so completely to the quantity of their contents, that no space or interstice is naturally found between them. However, we observe, that when any large blood vessel is opened by a wound of this cavity, the extravasated blood lodges between the anterior surface of the viscera, and the corresponding surface of the peritoneum, which lines the abdominal muscles. It is not, in general, found to diffuse itself over the entire surface, or fall to the lower part of the abdomen; as might be supposed, if a cavity really existed. On the contrary, we observe, that unless the quantity extravasated, be very considerable indeed, the effusion is confined to the vicinity of the wounded vessels. In these cases, we observe a fullness in the seat of the extravasation, but no tension. The circumscribed limits of the effusion, and the speedy coagulation of the blood, prevent us from ascertaining the nature of the injury by the test of fluctuation.

Ascites.

In a state of health, a secretion of a serous fluid takes place, sufficient merely to bedew the internal surface of the abdomen. This fluid is sometimes accumulated in considerable quantities, and then constitutes the disease of Ascites, or dropsy of the abdomen. In this instance, the water is lodged between the peritoneum, which lines the muscles of the abdomen, and that which covers the intestines; and, therefore, when we make an opening through the abdominal parietes to evacuate this fluid, there is no danger of our wounding the intestines; for these are removed from the reach of our instrument, by the interposition of the effused fluid. It not unfrequently happens, in the operation of paracentesis abdominis, that the stream of fluid suddenly ceases to flow, even before one-half of the collection shall have been discharged. This sudden stoppage is caused by the omentum entering into the extremity of the canula, and sometimes also insinuating itself into the eyes of the instrument, where these are very large. We are directed in such cases, to push back the omentum, by running a probe through the canula. This accident must cause delay in the operation; and the means generally adopted for remedying it, may subject the patient to peritoneal inflammation, from the violence done to the omentum. We are indebted to the late Mr. Dease, for a form of this

Tapping, a safe operation.

Stream of fluid suddenly stops.

How caused.

Ill effects of.

Mr Dease's improved Trocar.

instrument, which most effectually guards against this accident; and so completely does it answer the purposes for which it was designed, that it seems scarcely possible for human ingenuity to improve it further.

The abdominal muscles, are in many instances, rendered very thin by the distension which they have suffered. Yet, in many cases, to plunge the trocar through them at once, requires great effort, and has at least the appearance of much roughness, on the part of the Surgeon. You may avoid this, by previously making with a lancet, an incision through the integuments, large enough to admit the trocar. The peculiar cautions necessary to be observed, in tapping Ovarian dropsy, shall be reserved, 'till we come to describe the structure and diseases of the female organs of generation.

Incision with lancet previous to use of trocar.

It may not be unworthy of remark, that, in penetrating wounds of the abdomen, although no protrusion of the bowels shall have taken place during the treatment, yet this consequence always follows, when the wound is completely healed, and the patient resumes his ordinary occupation. It is necessary, therefore, to apprize the patient, during the treatment, of the probability of such an event, and to enjoin the early use of a truss. When the bowels have pushed out through a wound inflicted in the site of the recti muscles, we should take care

Consequences of penetrating wound of abdomen.

Caution when replacing the protruded intestines. in replacing them, that we mistake not the sheath of those muscles for the cavity of the abdomen.—This error is more likely to occur from the very loose connection which the posterior surface of those muscles has with the corresponding part of its sheath. Considerable danger must arise from this mistake; for even in the very attempt, the bowels will be subjected to such a degree of violence as must necessarily prove injurious. But should this error pass unnoticed, and the lips of the wound be closed by suture, while the bowels remain in this unnatural and confined situation, the death of the patient must speedily and inevitably ensue, I am the more particular in guarding you against this mistake, because I have seen it committed in an instance, where a lacerated wound was so very extensive as to reach nearly the entire length of the abdomen. How much more careful then should you be in wounds of less extent, where all the parts are so much less favourably situated for examination?

Having thus described the external walls of the abdomen let us next turn our attention to the viscera which it contains. External examination of the viscera influenced. When we undertake to ascertain by external examination the state of the abdominal viscera, we should not only bear in mind the variations in the form of its different regions By posture. induced by the posture of the body, but must also take care that the state of tension of the abdominal muscles shall not prevent us from making this examination in the most satisfactory manner. We must be cautious that we mistake not that state of rigid contraction into which the abdominal muscles are thrown by very slight causes, for indurations of the viscera. It is obvious, then, that these muscles should be relaxed as far as this can be done by the position of the body. The mode of accomplishing this has been already mentioned when speaking of Hernia, and therefore it is unnecessary to recapitulate it here.—You must, however, take care that the patient's head shall be raised forwards, and supported in that position by pillows: for if you allow it to be supported by the action of the Sternomastoid muscles, these will draw the recti abdominis into a sympathetic state of contraction, and thus the anterior surface will be made tense, and feel as if subdivided into distinct compartments. This state of the abdominal parietes has, I am persuaded, deceived some practitioners, and led them to pronounce that the patient laboured under an enlargement and induration of the liver, where no such disease existed.

By the state of abdominal muscles.

Action of sternomastoid renders abdominal muscles tense.

This mistaken for induration of the liver.

When an adult subject is laid in an horizontal posture, the anterior edge of the liver cannot be felt to descend below the edges of the false ribs, until you come within three or four inches of the Xiphoid cartilage. In the epigastric region you can feel the left lobe of the liver; along the edge of the left hypocondrium the liver cannot be felt.

Situation of the liver in horizontal posture.

In the erect posture.

When the subject is placed in an upright posture, the liver is found to descend at least two inches lower than while the body remains horizontal.

These remarks on the situation of the liver in the dead subject, will apply, in some degree, to its situation in the living body, and should influence our mode of examining into the state of this viscus by the touch. Some authors assert, that the liver descends considerably into the abdomen during inspiration; and therefore they advise us to direct our patient to make a full and long continued inspiration, while we are engaged in our examination. I cannot help thinking that this rule is founded on an extravagant idea of the influence which the motion of the Diaphragm has on the position of the liver, an influence which I have never been able to observe in practice. The relations of the liver to the neighbouring parts will point out the different outlets, by which the matter of an abscess formed in this organ may effect its discharge. Should the seat of inflammation and suppuration be near to the convex surface of this viscus, an adhesion may take place between the abscess and the diaphragm. The adherent parts, thus consolidated, being absorbed, the contents of the abscess will escape into the cavity of the thorax. In such abscesses, however, we often find that while the diaphragm on its lower surface adheres to the liver; it also adheres on its upper surface to the superincumbent lung, and thus the

Liver said to descend in inspiration.

This doubted.

Different points at which abscess of liver may discharge.

Into thorax.

Into bronchia.

matter of the abscess may be poured into the bronchiæ. If this be in large quantity, it may suddenly destroy the patient by obstructing the passage of air through the Trachea. When the abscess is seated in the convex surface near to the anterior edge of the liver, it may induce an adhesion with the abdominal muscles, and thus point externally in the right hypochondriac or true epigastric region. Should the abscess be seated in the concave surface of the right lobe, adhesion between the seat of the abscess and the colon as it passes under this lobe may take place, and by subsequent absorption of the adhering parts, the matter may be poured into this intestine.

In right Hypochondriac or epigastric region.

Into the colon.

In this way the matter of an abscess of the liver is discharged by stool. Sometimes the matter of an abscess of the liver is rejected by vomiting. We must presume that such had been seated near the lower surface of the left lobe, and that the succeeding processes of adhesion and absorption had formed a communication between the cavity of the abscess and the stomach.

Into the stomach.

J. L. Petit has written a long Essay in the Memoirs of the Academy of Surgery at Paris, in which he describes the over-distention of the gall bladder with bile, states the injury which had resulted from an opening made into this viscus, under an impression that the case was an abscess of the liver, and endeavours to lay down a series of symptoms by

Distention of gall bladder mistaken for abscess of liver.

which such dangerous mistakes may in future be guarded against.

Gall stones.

Biliary Concretions are often found in the gall bladder, these in general are small, and in considerable numbers, but in some few cases it has happened that some one of these concretions has arrived to a very great size, and has excited inflammation in the coats of the gall bladder, which terminated in adhesion with the colon, and subsequent ulceration of the adherent parts. By these means, this very large calculus has been discharged by stool. Some overlooking this mode of escape, have supposed that these large calculi passed along the cystic and common duct into the duodenum, and have reasoned a good deal on the degree to which these ducts may be enlarged by distention,

How very large ones get into the intestinal canal.

The ductus communis choledicus passes behind, and close to the head of the pancreas, in its course to the duodenum. From this we infer, that a schirrous enlargement and hardness of this portion of the gland may cause an obstruction to the flow of the bile along this duct, and thus give rise to the jaundice. We also observe two or three lymphatic glands lying close to this duct before it has yet reached to the pancreas. The enlargement of these glands I have known to produce in one case a permanent obstruction, and a jaundice of some years duration.

Jaundice caused by diseased panerea.

By enlarged lymphatic glands.

The Pancreas is subject to become hardened and enlarged, constituting the disease termed schirrus of that gland. From its situation between the aorta and superior mesenteric artery, such a condition of this gland may cause the pulsations of either of these vessels to be so very perceptibly felt through the parietes of the abdomen, as to impress us with a belief that the patient labours under aneurism of the aorta. While on one hand we are liable to suspect the presence of aneurism of the aorta when no such disease exists; we are, on the other hand, subject to overlook this disease when it really takes place. For, in some instances, the pulsation could not be felt during life, and the attendant symptoms being such as generally accompany other morbid conditions of the abdominal viscera had not pointed out any aneurismal affection.

Schirrus of Pancreas attended with pulsation.

Aneurism of aorta liable to be overlooked.

It is obvious, that all aneurisms in the abdomen must be behind the peritoneum, yet I have found, on opening the bodies of such patients after death, a large quantity of bloody fluid, lodged in the cavity of the peritoneum; although no rupture of this membrane could be discovered, by which the fluid could have had access to this cavity.

Aneurism in abdomen must be behind peritoneum.

Each orifice of the stomach is occasionally contracted, its coats being at the same time much thickened, and sometimes indurated.—This affection, which is termed schirrous, (perhaps improperly) occurs much more frequently in the lower than in the upper orifice. When the cardiac orifice is the seat of this disease, the solid food is denied access into this cavity, and is either instantly

Schirrus of the cardiac orifice.

rejected, or else lodges in the inferior portion of the œsophagus, where a pouch is often formed. In this, the food is allowed to remain for some time, and is then rejected very little changed.

Schirrus of pylorus.

When schirrus of the pylorus occurs, the food is received into the stomach; but in the latter stages of the disease, the solids, which have been retained for some time, seem to excite considerable distress, and are rejected by vomitings. In general, the interval of time between their reception and rejection is pretty uniformly the same in each individual.

Former not to be felt externally.

Latter can

The deep situation of the cardiac orifice and its proximity to the diaphragm precludes us from acquiring, by external examination, any knowledge of its schirrous state. The pylorus being situated more superficially and further removed from the concavity of the diaphragm may, by external examination, be discovered to be schirrous; but from the facility with which it can be moved in this cavity, it is liable to be mistaken for a tumor of the omentum.

Omentum.

Subject to form adhesions.

The Omentum is frequently found on dissection to have been the seat of disease. In many of those who have laboured under affections of the uterine system, the lower extremity of the omentum has formed adhesions to the posterior surface of the uterus or its appendages.—The texture of this membrane is subject to such morbid alterations, that we find it at different points converted into solid

To be converted into solid tumors.

firm tumours, of the size of an egg, while the membrane in the immediate vicinity of such tumors retains that delicacy of texture for which it is so remarkable.—These tumors are generally moveable, and always seem to lie superficially in the cavity. They are not unfrequently, attended with anasarca or ascites. This circumscribed form, and the facility with which they can be moved with the hand, will serve to distinguish them from induration and enlargement of the liver, but will not serve in every instance, to point out the real nature of the disease with unerring certainty.

Dropsy of the abdomen is so very frequently accompanied by enlargement of the liver as to have given rise to the rule of tapping on the left side of the cavity, lest the trocar should be plunged into a diseased liver.

Spleen sometimes much enlarged.

The Spleen on the other side is subject to enlargement, but much less frequently than the liver. In one case (a cast of which is preserved in our museum) this viseus had increased to such a size, that it descended into the hollow of the ilium.

Practical inference in tapping

Hence the necessity of distinctly feeling a fluctuation in that spot, which you select as the point for tapping.

Fluctuation the best guide.

It is hardly necessary to say, that this fluctuation will be less sensibly felt in cases of anasarca, combined with ascites; for there the interposition of the fluid in the cellular substance must render the walls of the cavitiy more thick, and must transmit the undulation with diminished distinctness.

On each side of the abdomen, that portion of the colon which lies between the crest of the ilium and lowest part of the false ribs, is, in general, covered with peritoneum on the anterior third only of its circumference; while the two remaining thirds of it are attached by cellular substance to the muscles upon which it lies. Large concretions or balls have (though rarely) lodged in these portions of this intestine; and it has been proposed as an operation in surgery, that we should make an incision through the muscles of the loins, then cut into the intestine, and so extract these balls. To this operation two strong objections lie:—First, we cannot ascertain the existence and seat of these concretions by unequivocal symptoms. Secondly, the relation of the peritoneum to these portions of the colon varies, in different subjects, In some, it not only gives a complete covering to this portion of the intestine, but it even forms a mesocolon, which allows it to approach more or less towards the vertebræ. In such irregularity of structure, it would be rashness to hazard an operation fraught with so much danger,

Proposal for cutting concretions from the colon.

Objections to this operation.

The records of surgery furnish us with instances of abscesses, in the substance of the kidneys.—Some of these, excited by calculi, have pointed externally on the loins, and the calculus has been discharged through the opening, either when made by art, or caused by the efforts of nature. Beware, however, of considering every collection of

Abscess in kidnies.

matter which appears in such situations as of this description. For, not unfrequently, the matter of psoas abscess makes its way through the muscles, and appears externally on the loins. While the early and free opening of the former procures immediate relief, a similar treatment of the latter too generally tends to hasten the death of the patient.

The Psoas abscess may be distinguished from an abscess of the kidney, by its preceding and concomitant symptoms ; by its more flattened form ; and by its freedom from discoloration of the integuments, until it arrives at its latest stage.

ANATOMY OF THE THORAX.

Form and subdivision of Thorax.

OF the Conical form of this cavity, and of the manner in which it is divided by the mediastinum, into two distinct compartments, you cannot be ignorant.

Diaphragm inclines from before backwards.

You know that the diaphragm forms the floor of this cavity, that to its tendinous part the pericardium and mediastinum are attached, and that the lungs lie upon its lateral portions, having their base shaped, so as to correspond accurately with the surface upon which they rest. In consequence of the different heights at which the diaphragm is attached, it is obvious, that the floor of this cavity represents an inclined plane, which descends considerably lower at the posterior, than at the anterior part. From the height to which the arch of the diaphragm rises in the Thorax, while its origins are from the lowest part of the sides of this cavity, it is obvious that this muscle, in its most natural state, lies closely applied to the lower ribs. Hence it follows, that a wound of the side, passing straight across the body, may at once, wound the viscera of both the cavity of the Thorax and of the Abdomen.

Is closely applied to the lower ribs.

Thorax and abdomen injured by same wound.

Hence too, it follows, that when the operation for Empyema is performed, at the place of election, (as it is termed) if a fluid does not flow out where the Thorax is opened, the operator may think that he has not penetrated into the cavity. And finding at the point of his finger, a fleshy plane close applied to the pleura, he continues his incisions more deeply; and often mistakes the liver for the lungs, from which, most fatal consequences have followed. Of such mistakes, Ravaton says, that he has frequently been an eye-witness.

In the operation for empyema, mistake resulting from connexions & form of diaphragm

The upper end of this cavity has been compared to the end of a truncated cone; this presents an opening of very confined dimensions, through which we observe a number of very important parts to pass.

Upper end of Thorax.

The lateral portions of this opening, are occupied by the narrow extremities of the pleuræ. These are found to rise above the level of the first ribs. The trunks of the subclavian arteries, are seen running from the central to the lateral parts of this cavity, and rising still higher above the ribs, as they pass towards the superior extremities.

How its lateral parts are occupied.

As these membranes and arteries ascend above the level of the first ribs, they would be exposed to much danger, were they not protected by the Clavicles.

How the plura and subclavian arteries are here protected.

When you raise the sternum, study well the relative position of the different parts which lay

Parts situated behind the sternum.

Venous trunk crossing from left side.

behind the upper end of this bone. You first see the venous trunk, formed by the conflux of the internal jugular and subclavian veins, passing across to the right side, in a direction obliquely from above downwards. This vein then, is more exposed to danger, from a punctured wound towards the left, than towards the right side of the cavity. In its course, this vein passes across the roots of the left carotid and common trunk of the right carotid and right subclavian arteries.

Arch of aorta.

The superior curve of the Arch of the aorta, rises up so high as to be on a level with the upper edge of the first ribs. When this portion of the artery is distended by aneurismal dilatations, we may expect that it will press against the upper edge of the sternum, or the cartilages of the first ribs, cause an absorption of these resisting parts, and make its appearance by pointing externally. It is surprising that the venous trunk just mentioned, is not thereby so compressed as to obstruct the flow of blood through it, yet, we rarely find symptoms of such obstruction in the living body.

Relative position of right

Of left carotid.

The common trunk of the right carotid and subclavian arteries arises from this arch on the left side of the trachea, runs across in front of this tube, lies along its right side, and ascends to a level with the clavicle, before it divides into its two branches. The left carotid arises from the arch, after it has passed to the left side of the trachea, and runs up along the left side of this tube.

Unusual course of right carotid.

In some instances the right subclavian has had an extraordinary origin and course. For it has arisen from the descending aorta, below the origin of the left subclavian, from this it has passed over to the right side, running either behind or in front of the æsophagus. This course of the artery is suspected to have been the cause of a particular species of dysphagia, termed lusoria: the difficulty of swallowing being experienced, when the food had arrived at that part of the æsophagus, crossed by this artery. Having carefully searched for an instance of this irregular course of the artery, during the present season, I was surprised to find four cases of it in the dissecting-room. The subjects of two of those cases were adults; the two remaining instances occurred in the bodies of children, but in none of them were there any traces of obstructed deglutition.

Supposed to cause dysphagia.

Punctured wound at top of sternum may wound these vessels.

From the position of these large vessels, it is obvious, that a punctured wound inflicted on the top of the Thorax (if the instrument be directed downwards) may divide some of those vessels, and thus prove instantly fatal.

Trachea.

The trachea descending behind the arch of the aorta, and having arrived opposite to the second or third dorsal vertebra, there bifurcates. At the place of forking, a number of these glands, termed bronchial, are situated. May not these glands, when enlarged and indurated, press on the æsopha-

Where it forks.

Enlarged bronchial glands

may compress the œsophagus.

gus, and constitute a particular cause of difficult deglutition.

Mamma.

Their structure.

The Breasts of females are so frequently affected with disease, as to render the study of their structure highly interesting to the Surgical practitioner. We find that the body of this gland is composed of a congeries of small glandular bodies. These are enveloped in one common dense membrane, which sends productions inwards, among the minuter glands, serving to support and keep them distinct from each other. This coat, by its internal surface, adheres so very closely to the gland, that we cannot detach them from each other, without wounding either the gland or the membrane. Externally the portion of this coat, which covers the anterior part of the gland, is overspread with a quantity of fat, which is collected in large masses; while the portion of this coat, which covers the posterior part of the gland, is connected to the pectoral muscle, by the medium of a very loose cellular substance. This conformation allows the the gland to be moved freely on the surface of this muscle. The dense texture of this investing membrane, will explain, why abscesses of the mamma are so late in being discharged outwardly.

Connexion with pectoral muscle.

Why abscess of breast slow to ulcerate.

Cancer of breast.

Among the diseases to which this part is subject, none is more formidable than Cancer, whether in its shirrous, or ulcerated state. For it so generally resists every mode of treatment hitherto proposed, that Surgeons in general, consider the extirpation of the diseased part, as the most likely to afford permanent relief to the patient. It is an established principle in the treatment of Cancer, wherever situated, that extirpation should not be attempted, unless the entire of the diseased parts can be removed; both these which were primarily the seat of the disease, and those which become subsequently affected by absorption. It has, however, in some instances occurred, that where an operation had been undertaken, with the hope of being able to extirpate all the diseased parts, the Surgeon has discovered, when too late, such a firm adhesion of the mamma to the pectoral muscle, and even to the ribs, as to prevent the completion of this painful operation.

How to judge of adhesion of breast to subjacent parts.

Richter lays down the following judicious rules, for discovering the degree of adhesion of the breast to the subjacent parts:

"If the breast can be moved backwards and forwards, whether the shoulder be advanced forwards, or drawn back, there is no præternatural adhesion. If the breast can be moved backwards and forwards when the shoulder lies forward, but is fixed when the shoulder is drawn back, it adheres to the external pectoral muscle. If it be firm and immoveable, whether the shoulder lie forward or be drawn back, the adhesion is in a higher degree. Again, the breast may adhere very firmly to the pectoral muscle, and yet be quite moveable, even when the shoulder is strongly retracted, if only the breast be moved in a direction, transverse to that of the fibres of the pectoral muscle. And so it happens, that the breast is thought perfectly moveable, while in the operation, it is unexpectedly found to be adhering and quite firm. But, with care, this may be perfectly ascertained before the operation, merely by moving the tumor backwards and forwards, in a direction parallel to the fibres of the pectoral muscle."

Having in this manner satisfied yourself, that the mamma does not adhere to the pectoral muscle, your attention should next be turned to the condition of those glands, through which the lymphatic vessels of the breast pass, in their course to the thoracic duct of the heart.

Three different situations of shirrous lymphatic glands.

These glands then may be discovered (when diseased) in three different situations. Sometimes they will be found lying along the edge of the tsernum; but this is the situation in which the enlarged glands are most rarely met with.

First along the edge of sternum.

Some of the lymphatic vessels of the breast pass into glands, which are situated on one side of the neck, immediately above the clavicle, and on the outer edge of the sterno mastoid muscle. Among the glands situated here, some lie superficially, others lie far removed from the surface. The morbid enlargement and hardness of the former, can readily be ascertained, but when the latter are diseased, we cannot with certainty determine what

what number of them is affected; we cannot determine whether this disease may not even have seized upon some of these glands, which pass down into the chest. If we could be assured, that only the superficial glands were diseased, we might undertake their removal, as we should only have to encounter hæmorrhage, from the division of some of the scapular arteries But as we cannot be certain of the extent to which the deeper seated glands are affected, and as we know that an attempt to remove these, will be attended with the risque of wounding the subclavian vessels, we must altogether abandon the idea of such an attempt. Hence we may lay it down as a rule of practice, in the treatment of Cancer, not to undertake the removal of the breast, when we find the lymphatic glands above the clavicle, affected by the absorption of the cancerous virus.

Danger of removing these.

The lymphatic glands leading to, and lying in the axilla, are affected much more frequently than those in either of the former situations. As a chain of these glands lies under the edge of the pectoral muscle, they might pass unnoticed in a superficial examination. You should, therefore, search for enlargements of these glands, while the arm of the patient is drawn forwards, for by this expedient, the edge of the pectoral muscle is relaxed, and an opportunity afforded, of passing the finger further under its edge. The propriety of removing the breast in such cases, will rest prin-

Third, in the axilla.

How to detect these glands.

cipally on the practicability of removing all the diseased glands from this cavity. Of course, we can only be enabled to form a correct opinion on this subject, by a knowledge of the Anatomy of the Axilla.

Form and boundaries of axilla.

The Axilla, if considered as a cavity, may be said to be of a triangular shape, the vertex of which reaches up to the base of the coracoid process of the scapula, the sides being constituted by the ribs on one part, and by the humerus on the other, while the base is formed by the edges of the pectoralis major, and latissimus dorsi muscles; the former bounding its cavity anteriorly, the latter, posteriorly. The space thus bounded, is occupied by blood-vessels, nerves, and lymphatic glands, with some interposed fat, and a very large proportion of cellular substance. Many of the lymphatic glands are found to lie under the edge of the pectoral muscle, some occupy the middle of the axillary space, while others are situated along the posterior border of the Axilla, near to the neck and inferior costa of the Scapula. Matter absorbed from a Cancer of the breast, may affect any or all of those lymphatic glands, and, therefore, the removal of them oftentimes forms a part of the operation of extirpating a cancerous mamma. The feasibility and safety of this operation, must of course, depend on their depth in the cavity, and their relation to the nerves and blood vessels which lie there The opening of this cavity between the

Situation of the lymphatic glands in the axilla.

Axillary artery not

edges of these muscles being so narrow, in proportion to its depth, must render the removal of the deeper seated glands, a task of some difficulty. But their depth in those cases, though the cause of difficulty, is not the cause of danger: the degree of danger is to be estimated by their proximity to some large blood vessel in the cavity. We are generally cautioned against attempting the removal of those glands, which lie close upon the trunk of the axillary artery; and this rule is laid down in such a manner, as might induce you to suppose, that no other large vessel is endangered in this operation. Let us then examine how far the trunk of the axillary is liable to be divided, and whether we do not run a risque of wounding some branches so large, as to give rise to a fatal Hæmorrage.

the only one liable to be wounded.

The Axillary artery in its course, from the top of the Thorax to the neck of the Scapula, runs obliquely across the cavity of the axilla. In this course, it is gradually approaching nearer and nearer to the scapula, and at the same time, tending to apply itself to the lower surface of the pectoral muscle. When it has arrived at the neck of the scapula, it then lies close to the under surface of this muscle. From this point, the artery pursues its course contiguous to the muscle, and protected by its edge. Now, as the breadth of this muscle rapidly decreases in the interval between the neck of the scapula, and its insertion into the humerus,

Course and relative position of axillary artery.

it is obvious that the artery, in its course along the humeral part of the axilla, is more superficially seated. From this view of the course of the axillary artery, it is plain that it will be endangered when we carry our incisions at the humeral part of the axilla, close to the edge of the pectoral muscle, even though these incisions be but superficial. When our incisions are made into the axilla, near to the Thorax, the axillary artery is endangered, as often as these are carried deeply towards the apex of the axillary cavity. It is scarcely necessary to observe, that the axillary vein is liable to be wounded before we reach to the artery, as the former is less deeply situated in the cavity than the latter.

Glands along lower border of scapula.

We sometimes find diseased lymphatic glands, lying along the posterior border of the axilla, and these being far removed from the direction of the axillary artery, may be supposed to admit of extirpation without any risque. However, we shall find that the trunk of the sub-scapular artery is endangered by their removal. For this branch leaves the axillary artery opposite to the glenoid cavity, and runs transversely towards the lower border of the scapula. Hence it is plain, that its course lies across the humeral end of the cavity, and consequently it is liable to be wounded in extirpating any glands which are situated towards this extremity of the axilla. Now, the subscapular artery is so large, that a division of it must be

Subscapular artery endangered by their removal.

dangerous to a patient, of any habit of body whatever, and must instantly prove fatal to a delicate female, reduced by previous sufferings of pain, and hectic fever, and exhausted by the preceding steps of such a painful and terrifying operation.

Wound of this artery may prove instantly fatal.

Many glands lie at a distance from either edge of the axilla. Their removal cannot cause a hæmorrhage immediately fatal, but may be followed by some troublesome bleedings. For the thoracic arteries are liable to be wounded in removing those glands.

Glands not near to either edge

These arteries lying in a deep cavity, and surrounded by loose cellular substance, can with difficulty be secured by the tenaculum and ligature. For they will recede instantly on being divided, and shrinking in among the loose cellular substance, will inject it with blood. Thus the extremity of the divided artery will be buried in the distended cellular substance, so that its open mouth cannot be distinctly seen. Hence secondary hæmorrage is much to be dreaded under those circumstances. To prevent all these ill effects, which might result from a division of the thoracic arteries, you will only have to observe this rule. Before you dissect out any large gland, or cluster of glands, search for any large veins connected with them, if any such be visible; catch the vein between your finger and thumb, you will feel the pulsation of the artery, pass a needle and ligature round the vein, and this will also include the artery; for

Their removal may cause troublesome bleedings.

How to prevent these bleedings.

the thoracic arteries and veins accompany each other with wonderful regularity. Having thus secured the artery, you may cut it across in the interval between the ligature and the diseased gland.

A species of tumor in the breast resembling shirrus.

Although the diagnosis between schirrus and other diseases of the breast, be not founded on the anatomical structure of this part, and consequently does not come within the scope of this work, yet I cannot refrain from stating the symptoms of another species of tumor, which is occasionally to be met with in the breast, as it is not described by any author I have hitherto seen.

Description of this disease.

This is a distinct tumor or hardness in the breast, generally seated deep in the substance of this gland, and towards the axilla. This is usually traced by the patient to some slight hurt. In size, it scarcely ever exceeds a walnut. Its surface seems rough; but this is caused by its being felt through the gland. It is occasionally attended with some slight pains; these are induced by any distress of mind—by wearing the clothes tight across the breast—and by a costive state of the bowels. On the approach of the menstrual period, these pains increase, and cease on this evacuation being completed. A temporary enlargement of the tumor attends these attacks of pain, and retires on their cessation.

The subjects of this complaint are young women, generally under thirty years of age. In one instance, the patient was nearly forty years old, and unmarried; in another, the lady was married, but had not any children, and was irregular in menstruation. These tumors disappeared in such of these patients as became nurses, and in the others have remained stationary for many years. The only treatment I conceive they require, is such as tends to restore the general health. A lotion of aqua ammoniæ acetata; or camphorated spirit of wine applied with a feather, and allowed to evaporate, are the topical applications which I have employed with most relief to the patient.

Treatment

I have introduced the mention of this disease, not for the purpose of laying down a plan of treatment, but of preventing this kind of tumor from being mistaken for a true schirrus.

Why introduced here.

We shall defer any further observations on the diseases and accidents to which the parts connected with the axilla are subject, until we come to speak of the diseases and injuries incident to the exremities.

ANATOMY OF THE NECK AND THROAT.

Mode of commencing the dissection.

BEGIN the Dissection of this part by an incision through the skin, along the clavicle and top of the sternum—then make another incision from the top of the sternum to the chin, and continue this along the side of the face to the upper part of the ear. Dissect back the skin, taking care not to injure a superficial, but pretty strong fascia which lies immediately under, and closely connected with the skin.

Fascia of throat.

Its extent.

Expose in this way, the fascia of one side of the throat. By pinching up and drawing this fascia with your forceps, you observe, that it passes from the neck down upon the thorax, without having any attachment to the clavicle or sternum. You also observe it stretching over the surface of the parotid gland, passing above the upper end of this gland, and blending itself with the aponeurosis of the temporal muscle, on and above the zygomatic process. This fascia is very closely connected with the cartilaginous tube of the ear, being of a close and firm texture where it joins the inferior portion of this tube; but where it joins the anterior part of the tube, it is of a more loose and open texture—being here perforated by many holes, obviously for the transmission of nerves and blood-vessels. Anteriorly to the masseter muscle, this fascia seems to be implanted into the base of the lower jaw. While this fascia lies exposed to your view, consider well what influence it may have upon the diseases and operations to which the different parts lying under it are subject. And, first, in inflammations and suppurations of the parotid gland. In such cases, even though the quantity of matter be great, yet this fascia will prevent the elevation of the swelling from being considerable, especially towards the upper end of the gland, because here the attachments of the fascia are of very considerable extent and firmness The nature and unyielding texture of this fascia, will not permit the matter to point as soon as formed in the upper extremity of the gland; nor will it allow us to ascertain satisfactorily, the presence of the fluid by the unequivocal test of fluctuation. If, then, we be ignorant of the structure and connexions of this fascia, we shall probably hesitate to make an opening into the tumor, and by our indecision and timidity, shall subject our patient to sufferings, as intolerably severe as unnecessarily protracted. To what a pitch these may arise, judge from the following statement:

Its influence in abscess of pariotid gland.

A young and delicate lady was affected with a swelling, situated at the lower and back part of

Example.

the cartilaginous tube of the ear. This, from its commencement, was attended with excessive pain, and redness of the integuments; she soon became unable to chew, and swallowed fluids only with the greatest difficulty; her nights were passed without sleep, even when she took opium in large doses; her strength and health were at length reduced to the lowest ebb; and now part of the matter was spontaneously discharged, by an opening near the angle of the jaw; but this did not occur until after a series of sufferings, protracted for four weeks. Before this event took place, the swelling had extended down below the clavicle; and the integuments of the entire side of the neck, and even those on the upper part of the breast, were red and inflamed. In this case, from an early period, a small quantity of matter was daily discharged through the external ear; but was too inconsiderable to afford relief to the patient, and unfortunately did not excite in the mind of her attendant, that enquiry into its source, which must have led him to a judicious and decisive mode of treatment.

Incisions not to be hastily made into parotid gland.

It is not my intention by this statement, to encourage the young practitioner to make deep incisions into this gland, immediately on the first attack of inflammation, lest he should wound some of the branches of the temporal artery, which are distributed to it in abundance. I only wish to convince him of the impropriety of waiting for a distinct fluctuation, such as he has been in the habit of feeling in abscesses immediately under the skin, unconnected with a fascia or aponeurosis.

Abscess of parotid sometimes bursts into meat. audit. extern.

We meet, however, with some instances of suppurations in this gland, which, though not timely opened by the surgeon, have yet a favourable, and spontaneous termination; for the matter makes its way into the meatus auditorius externus by an opening sufficient to discharge the contents of the abscess in a short time. Such openings probably take place through some of those fissures, which are found in the cartilaginous portion of the tube. In this way I have observed many of those abscesses, supervening an acute fever, to terminate.

Some remarks on the morbid conditions of this fascia shall be made when we come to speak of the fascia investing the limbs; at which time we shall also consider what benefits may be derived from a division of this fascia and the platysma myoides, in cases of contraction from burns and scalds in the throat and neck.

Lymphatic glands lying on parotid.

Close to the upper edge of the parotid gland, and in contact with the anterior part of the meatus auditorius externus, lie two or three small lymphatic glands, distinguishable by their colour from the parotid. Some few lymphatic glands are also seen on the surface and on the lower edge of the parotid.

T

Enlargement of these mistaken for schirrous parotid.

May not the chronic enlargement of some of these lymphatic glands have been mistaken for a schirrus of the parotid itself, and the removal of such by the knife been boasted of as the extirpation of the parotid gland? When you contemplate the nerves and blood-vessels which pass through the substance of this gland, and also the depth to which it sinks, as it is imbedded between the ramus of the lower jaw and the mastoid process of the temporal bone: When you reflect on the very firm and almost inseparable attachment of the gland to these parts, you will be very tardy in giving credit to the stories of extirpation of a schirrous parotid gland.

To ascertain the Practicability of such an operation, let us investigate more minutely, the anatomical structure and relations of the parotid gland.—

Anatomical structure and relations of parotid.

Its breadth at upper extremity.

This gland extends from the zygomatic process of the temporal bone to about a quarter of an inch below the angle of the lower jaw. Its breadth in the vicinity of the zygomatic process, extends, transversly from the meatus auditorius externus to the anterior edge of the masseter muscle, at least some part of the gland accompanies the duct until it has reached to the anterior edge of this muscle.

Its depth at upper extremity.

The depth to which this gland here sinks, is such as renders it difficult, on the dead body, to dissect out that portion which lies between the temporal and lower maxillary bones; and this, with the advantages of having the skin previously stripped off, and the view undisturbed by any hæmorrhage.—When such difficulties occur in the dead, how can we hope to surmount those which must be superadded in the living body.—The lower end of this gland sinks very deeply from the surface, so that it lies on the digastric, where this is about to pass through the stylo-hyoid muscle. The depth then of the lower end of this gland is not much less than that of its upper end, although it is not here confined within such narrow limits by its anterior and posterior boundaries.

Depth of lower end.

We shall, however, find still stronger objections to this operation than those which arise from these difficulties. We shall find it attended with such unavoidable destruction of important parts as must render the attempt most certainly fatal. First, the portio dura of the seventh pair of nerves, which passes out of the stylo mastoid hole, and then runs through the body of this gland to its destination on the face and neck, the trunk of this nerve must necessarily be cut across. A paralysis of this side of the face would be an inevitable consequence of the division of this nerve. The termination of the carotid artery, which is yet to give off the temporal and internal maxillary arteries, enters into the lower extremity of this gland. Unless this be tied before the lower part of the gland is raised, a violent hæmorrage must instantly carry off the patient.

Extirpation of this gland cannot be effected without wound of,

Portio dura.

External carotid artery.

The difficulty of dissecting down to this artery, and then passing a ligature round it, need not be

Difficulty of passing a ligature

round this artery. pointed out to any one who reflects that it passes from under the digastric and stylo-hyoid muscles, as it is about to enter into this gland.

Some, aware of the danger and difficulty of this part of their supposed operation, assert, that they finished the removal of the parotid by tying a ligature round this portion of the gland, and thus causing it to slough away. But, granting for a moment, the practicability of this step, yet it must appear inconceivable how they could dissect out even the upper portion of the gland. For, independently of its position, and the depth to which it sinks between the temporal and lower maxillary bones; independently too of the embarrassments which must attend the hæmorrage from the unavoidable division of many small arteries and large veins in the first steps of the operation, the Surgeon has to cut across the trunk of the internal maxillary artery; for this artery passes off from the continued trunk of the carotid completely across the substance of this gland. So that this gland cannot be detached from one half of the ascending ramus of the lower jaw, without the certain destruction of this artery. The end of the divided vessel shrinking in under this bone, cannot afterwards be secured by ligature or by compression. Should the operator leave behind him any part of the schirrous gland, he must be aware that his operation will be followed by a return of the disease.—If to avoid this error, he

Difficulties of dissecting out upper end of parotid.

Internal maxillary artery would be wounded.

should dissect at all deeper than the seat of the upper part of this gland, he will almost inevitably wound the trunk of the internal carotid artery, which runs anterior to the root of the styloid process, or of cutting into the internal jugular vein, which runs immediately behind this process.

Danger of internal carotid and jugular vein.

Behind the root of the mastoid process a pretty large lymphatic gland lies between the bone and the fascia of the neck. This gland is not unfrequently in children the seat of inflammation, which sometimes proceeds slowly to suppuration; the matter, being bound down by this fascia, an early opening is required.

Lymphatic gland behind mastoid process

Often suppurates.

Requires an early opening.

On detaching the fascia and platysma myoides from the base of the lower jaw, the Submaxillary gland is seen stretching from the os hyoides nearly to the base of the chin. Between the upper end of this gland and the base of the chin are interposed two lymphatic glands, corresponding to the two lobes of the submaxillary. The extirpation of one or both of these glands when enlarged, has passed with some, for the extirpation of the submaxillary gland itself.

Submaxillary gland

With two lymphatic glands close to it.

The impracticability, however, of removing an enlarged submaxillary gland may be readily conceived, by observing, that the angular or labial artery runs along the groove in the body of this gland; and also by recollecting the depth to which the gland penetrates; a portion of it turning in un-

Submaxillary gland cannot be cut out.

Reasons assigned.

der the mylohyoideus, while the body of the gland lies on the stylo and hyoglossi muscles.

The anatomy and diseases of the sublingual gland shall be reserved for the description of the tongue.

Lymphatic glands on side of neck.

When you raise the sterno-mastoid muscle, especially in young subjects, you find all the side of the neck, from the great blood-vessels back to the edge of the trapezius, thickly covered by an immense number of these glands. You must have a recollection of the great number of these, and of the space which they occupy, in order to comprehend the cause of that great deformity which is observed when an enlargement of all those glands occurs at once.

Deformity caused by these enlarging.

This disease, which I believe to be of rare occurrence, is of a chronic nature, and is productive of much less distress to respiration and deglutition than you might expect, from the increased bulk of the parts. The exemption from such distress, may be owing to the situation of these glands on the sides of the cervical vertebræ.

Lymphatic glands in vicinity of æsophagus.

From the thyroid gland, down to the sternum, a large number of lymphatic glands are found, some lying before, and some behind the carotid and subclavian arteries. Many of these lie so close to the sides of the trachea, and œsophagus, that when enlarged, they may press on the latter, especially in the vicinity of the top of the sternum, and cause difficulty of deglutition.

The external jugular vein.

The External Jugular vein lies covered by the fascia and by the platysma myoides, the course of the vein corresponding very much with the direction of the fibres of this muscle.

Line of incision best for opening it

This coincidence of direction points out the propriety of opening this vein, when we wish to draw blood from it, by an incision which shall be more or less oblique with respect to those fibres.

Superficial veins of throat.

Cautiously raising the fascia from the forepart of the neck, you find a vein descending from each side of the face, and running along the side of the throat by the anterior edge of the sterno hyoid muscles. These veins acquire a considerable size by the time they come down to the base of the thyroid gland, and they are connected together by a large venous trunk, which crosses the throat at a greater or less distance below the base of this gland.

Wounds of these troublesome in operation of bronchotomy.

It is obvious, then, that in cutting through the integuments in the operation of bronchotomy, this connecting venous trunk may be opened. This accident would embarrass the operator, by concealing the parts from his view ; but can hardly be supposed to prove dangerous, by pouring blood into the trachea after the opening has ~~been~~ been made into this tube. For, observe, that all these veins, the lateral branches, as well as the connecting trunk, lie immediately under the common superficial fascia of the neck, and above that fascia which invests all the small muscles, passing between the sternum and larynx.—Now make a

Deep dissection of trachea.

slight incision through the internal fascia, where it lies between the sterno-hyoid and thyroid muscles of the opposite sides; and separating these muscles from each other, the thymus gland will be seen in young subjects, stretching with its cornua up to the base of the thyroid gland.

Thyroid veins.

The Thyroid Veins are seen collecting their branches from the gland, and then running down along the middle of the trachea in one or more trunks of very considerable size.

Difficulties attending the operation of bronchotomy.

Here again reflect on the difficulties which are likely to occur when you perform bronchotomy on patients under the age of puberty; for, if you make your incision only so low down as midway between the sternum and larynx, your instrument may pass through the substance of the thyroid gland, which is proportionally larger in children than in adults. And perform it at what part of the trachea you may, still you are in danger of opening the thyroid vein when it runs single, or either of the thyroid veins when there are two trunks. Should this accident occur, the blood will readily flow into the trachea, close to which the vein runs, and will be prevented from escaping through the external wound, by all the muscles and the integuments which cover the trachea. This stage of the dissection, however, affords us a view of that spot in which the operation may be performed without any of these inconveniencies; and with the additional advantage of

Spot where this operation may be performed with great advantages.

performing it on a part which lies much more superficially; for we see between the cricoid and thyroid cartilages a triangular space, bounded on each side by the crico-thyroidei muscles, and filled up by a membrane, which connects the cricoid to the fissure in the base of the thyroid cartilage.—This space, in its widest part, near to the thyroid cartilage, measures five-eighths of an inch. The distance between the cricoid and thyroid cartilage is three-eighths of an inch.—This spot can be readily discovered in the living body, the prominence of the thyroid cartilage, serving as a guide. Between this membrane and the integuments a small depth is interposed, and no large vessels run on its surface. As this membrane is situated along the inferior margin of the thyroid cartilage, an opening made through it will enter the larynx below the rima glottidis, and thereby secure all the advantages which result from an opening made in any part of the trachea.

Difficulty of pushing a trocar into trachea.

Another, but a more slight inconvenience in the ordinary operation of bronchotomy, arises from the difficulty of keeping the trachea in a fixed position. This, however, applies principally to those modes of operating in which it is proposed to plunge an instrument into the trachea without having previously laid it bare.

Operation of tying.

It is only by careful examination and repeated study of the anatomy of the neck and throat that the carotid artery.

Line of incision.

Where the artery is most easily tied.

Descendens noni when most endangered.

you can be prepared for the bold operation of tying the carotid artery in cases of aneurism of the trunk or of a wound in its deep branches. You know that the common carotid bifurcates a little above the top of the larynx; and therefore you see that an incision to uncover this trunk should not begin much above that point. If the incision be continued down to the clavicle along the anterior edge of the sterno-mastoid muscle, it will be found, particularly at its upper part, to run very much in the line of the artery, though a little anterior to it. In order then to expose the fascia which envelopes at once the jugular vein, par vagum and carotid artery, you must draw backwards the exposed edge of this muscle. The omohyoideus muscle is seen crossing this incision about two inches, or two inches and a half above the clavicle. The artery is deeply covered as it ascends to the larynx, and can, therefore, be more easily tied in proportion as it has risen above the clavicle. The descendens noni, is more liable to be wounded in the upper than in the lower part of the incision, as this nerve advances forward on the sterno hyoidei muscles, in its course down along the side of the throat.

Jugular vein alternately expands and recedes.

On cutting through the fascia which invests the carotid artery with the jugular vein and eighth pair nerves; the vein will be found alternately to advance and recede, according as its state of distention is influenced by the different states of respiration: and, therefore, it should be held back by the finger of an assistant, while the operator is exposing the artery, and detaching it from its connexions.

How to avoid including 8th pair of nerves.

The eighth pair of Nerves is more intimately connected with the vein than with the artery, lying under the former; so that when you are to pass your needle, it will be more prudent to introduce it on the outer side of the artery. By this mean the nerve will be secured against injury, as it is easy for the Surgeon to introduce the instrument between the nerve and artery: while on the contrary, if the needle be introduced on the inner side of those vessels, the operator can with difficulty avoid including the nerve and artery in the ligature. By using an aneurism needle of silver unalloyed, such as is recommended by Mr. Abernethy, which admits of bending with a very slight touch, this step of the operation will be much facilitated.

Difficulty of discovering an aneurism of carotid artery.

When you consider the parts which cover the carotid artery, and the manner in which these are connected together by the fascia of the throat, you may conceive how difficult it must be to form a decided opinion of the existence of an aneurism of this artery. And yet these are not the only causes of difficulty. For the vein and artery are accompanied down the neck by a chain of lymphatic glands, the enlargement of one or two of which, would be productive of symptoms nearly the same with those which attend aneurism of the artery.

Parts most frequently wounded by attempts at suicide.

In many instances, those unfortunate persons who attempt to commit suicide, inflict the wound in the upper part of the throat. In the majority of such cases, the os hyoides is separated from its connexion with the thyroid cartilage, and the epiglottis detached from its connexions with the larynx, still continues its attachment to the base of the tongue. This is rather a wound of the mouth than of the throat, and through it the food comes out along with the saliva, because the anterior wall of the mouth is no longer entire. The trunk of the superior thyroid artery, will probably be opened by such a wound. At all events, some of its branches must; and the hæmorrage from these vessels will be profuse, if not suppressed by the fainting of the patient, as is often the case. It is asserted that the hæmorrage from these vessels, has even proved immediately fatal. The profuse bleeding which attends such wounds, has induced some Surgeons to mistake these cases for wounds of the carotid arteries. You may, therefore, be assured, that almost every history which has been recorded, of wounds of the carotid's terminating favourably, has been founded on this mistake.

Whence the profuse hæmorrage.

Why the carotids so frequently escape unhurt.

The carotid arteries, you may remark, cannot be affected by a wound, of this part of the throat, unless it be carried very deeply; because you see them lying at the sides, and almost behind the larynx. These arteries you observe, are, from their situation, much more endangered by a wound made in the lower part of the neck.

These wounds sometimes fatal from other causes.

The nature of the wound made in these attempts, is such, as generally leaves room to hope for a favourable termination. In some cases, however, that morbid condition of the system which preceded, and which in all human probability, produced the attempt, prevents the wound from ever assuming a healing appearance. A remarkable instance of this occurred in the following case:

Example.

A middle aged man attempted to commit suicide, by cutting his throat with a razor; the wound was supposed to have passed between the os hyoides and thyroid cartilage, and was about two inches and a half long. Three points of suture were passed through the lips of the wound, and these were supported by adhesive plaster and posture. He refused to take any nourishment until the second day; when he attempted to swallow a little milk, one-half of which was observed to escape by the wound. On the fourth day all the sutures gave way. A cough, with which he had been previously troubled, became much more severe, after the infliction of his wound. He had no appetite—complained of constant thirst—and sweated profusely in the nights. The wound never put on any appearance of healing; on the contrary, ulceration extended down along the thyroid cartilage, and this soon became bare and carious. Opiates served to mitigate the severity of his cough. He daily declined in strength—some of his drink continued to escape by the wound, until the period of his death, which took place in nine weeks after the infliction of the wound.

Appearances on dissection.

On examining the parts after death, it was found that a considerable portion of the upper and anterior part of thyroid cartilage had been removed by absorption; that the wound which now appeared as a round opening, led into the upper part of the larynx, and that the epiglottis still preserved its connexions with the larynx. How shall we account for the escape of his drink through a wound of the larynx, as this really was?

Enlargement of thyroid gland.

That enlargement of the Thyroid gland, called Goitre, we know to be but little affected by any medicines or external applications hitherto employed. This disease, though not of a painful nature, yet induces such deformity as to render the mind of the patient miserable. He sometimes implores the Surgeon to undertake any operation, however hazardous, for his relief. But to such solicitations nothing should tempt you to yield; for you should recollect the large supplies of blood which this gland enjoys, even in its healthy state, and the free communication between its different arteries. You should also recollect that the inferior laryngeal artery lies very deep on the forepart of the cervical vertebræ, behind the trunks of the carotid artery and eighth pair of nerves. It is

Why it cannot be extirpated.

not necessary to say, that under such cirmumstances the Surgeon must find it extremely difficult, if not absolutely impossible, to secure the end of the artery when divided.

Cautions for introducing instrument into æsophagus.

When you are to pass an instrument from the nose into the æsophagus, be careful to make the patient keep his tongue within his mouth. This will prevent the instrument from passing into the larynx; for in this position of the tongue, the epiglottis is laid down on the glottis. Whereas, if the instrument be introduced while the tongue is pushed out of the mouth, the epiglottis is raised up, so as to expose the opening of the larynx for the reception of the instrument. The same rule should be observed when you are to introduce the instrument by the mouth.

Inflation of lungs.

Inflation of the lungs, by a tube that passes through the nostrils into the top of the pharynx, is one of the principal means employed for the resuscitation of drowned persons. The object of the Practitioner, however, is often defeated, it having been found in many instances, that the air had distended the stomach, while an inconsiderable quantity (if any) had entered into the lungs. Such disappointments may be guarded against, by passing this tube only so far down, that its point shall reach nearly to the base of the tongue, and then pressing the trachea gently backwards against the cervical vertebræ. For by this expedient the æsophagus will be compressed between the bodies

How frustrated.

How these failures may be prevented.

of the vertebræ, and the broad posterior part of the cricoid cartilages, while the opening and passage of the larynx remain perfectly pervious.

Foreign bodies lodged in æsophagus How supposed to cause death.

It has been said, that foreign bodies stopping in the Æsophagus, have caused immediate death. This event has been ascribed to the pressure made by such body on the larynx, or trachea, so as to intercept the passage of air through this cartilaginous tube. But a moments reflection on the structure of the larynx, must convince you, that no pressure to which it can be subjected, by any body lodging behind it in the æsophagus, can have the effect of compressing its walls so as to close its canal. Again, should the foreign body stop in a lower part of the æsophagus, it cannot cause compression of the trachea to a dangerous degree. For the connection of the trachea and æsophagus to the surrounding parts, is made by means of such loose cellular substance, as will permit either to elude the danger arising from the pressure of any body lodged in the other. Besides, by bending forward the neck, the compression of the muscles against the anterior part of the trachea, will be removed; and thus the pressure made against the posterior part of this tube, by a foreign body lodged in the æsophagus will be evaded. To what other cause death in those cases is to be ascribed, I shall not pretend to say; as it has not fallen to my lot to examine the bodies of such patients.

This explanation not applicable to larynx.

Nor to trachea.

Sometimes a foreign body slips into the larynx, from which, if it is not instantly rejected, almost immediate death ensues. In some instances however, the foreign body descends into the trachea, and lodging there, produces such severe irritation, that the patient is certainly though more slowly carried off.

Foreign bodies in larynx.

The Æsophagus is but too often the seat of stricture. The contraction of this tube creeps on so slowly, that in some cases the canal has been completely closed before any effort has been made for the relief of the patient. Under these distressing circumstances, the Surgeon might feel himself justified in using a considerable degree of violence, for the purpose of forcing open the passage. But to this practice many objections occur. For the instrument instead of being pushed down through the constricted part of the canal, may be forced out through its side, immediately above the seat of the disease. So that if the stricture occupy any part of the æsophagus, which lies in the thorax, the instrument may be forced into the mediastinum or even into the thorax, and thus a passage for liquids at least, be opened into either of those cavities. Should the stricture be seated in the upper part of the æsophagus, we run the risque of wounding the carotid artery, the jugular vein, or eighth pair of nerves, by the instrument forcing a passage through the coats of the tube.

Stricture of æsophagus.

Objections to force instrument through them.

Dangers of such attempt increased by state of æsophagus

The dangers which beset every attempt mechanically to destroy strictures of the æsophagus, are most materially increased, by the changes which the disease induces on that portion of the tube, immediately above the seat of stricture. For here a remarkable dilatation takes place, so great in fact, that we find it described by different writers, as a pouch formed by the æsophagus above the seat of stricture. It is obvious that any instrument employed for the purpose of forcing a passage through the stricture, will almost inevitably be pushed into this pouch, and forced through the sides.

Objections to caustic in such cases.

The objections to which an attempt to force open the constricted portion of the æsophagus is subject, apply with equal force to the use of caustic bougie in such cases.

ANATOMY OF THE PELVIS.

THE Anatomy of the Pelvis is an object of no less difficulty to the Surgical Student, than of utility to the Surgical Practitioner.

Importance of an accurate knowledge of this piece of anatomy.

The advantages derived from a thorough knowledge of this piece of anatomy; the light which it throws upon the nature of some obscure diseases; the confidence which, in a variety of circumstances, it must impart to the operator, will more than repay him for all the pains and labour which he must necessarily bestow on the many intricate and varied dissections of the same part. For instance, a knowledge of the anatomy of those parts, can alone enable the Surgeon to perform with safety, the arduous and hazardous operation of Lithotomy. For the incisions are to be carried through a space so confined, and so surrounded by important parts, that the slightest deviation of the knife may be attended with the most serious consequences. Nor can the Surgeon without an intimate knowledge of the anatomy of the Pelvis, understand the causes of the many failures he may meet with, in attempting to relieve his patients from retentions of urine; and consequently he must be indebted to

In lithotomy.

In retentions of urine.

blind chance for those instances in which he may happen to accomplish his object. An ignorance of the anatomy of those parts, not only subjects the Surgeon to the disgrace of total failure, but likewise subjects the patient to the probable loss of life. In many cases of affections in the urethra or bladder, the life of the patient, which would have been spared by the disease, has fallen a sacrifice to unnecessary and ill-directed force used in the introduction of a Catheter or Bougie. For in many of those cases, the constitution is sympathyzing strongly with the diseased condition of the urinary organs; and at the same time is so much affected, that it cannot without danger, admit much additional irritation. How often do we find the Surgeon indebted for a short lived success, rather to chance than to skill. How often do we find that the same Surgeon has been in the habit of passing the same instrument for days together; but at length, from some accidental alteration in the position of the patient, or some unobserved deviation in the direction of his instrument, he meets a resistance, which his anatomical knowledge does not enable him to comprehend or surmount?

In passing bougie or catheter.

Do not attempt to dissect the soft parts of this cavity, without refreshing your memory by a view of its more solid boundaries. Examine the Pelvis of an adult stripped of every softer part, even of its ligaments. Next study the pelvis with its ligaments. Compare the Pelvis of the adult male with

Review of the bony structure of Pelvis necessary.

that of the female; of the adult with that of the child. You must next examine this cavity as connected with the trunk of the body, and carefully mark the relative position of the one to the other. Make this examination on the recent subject, and not on the preserved skeleton For should you examine it only on the latter, you will be misled in a matter of the greatest consequence to the practising Surgeon. For in this way only can you acquire an accurate knowledge of the relative position of the axis of the pelvis to that of the trunk of the body. This knowledge affords the greatest assistance in ascertaining the nature of some obscure diseases, and is particularly subservient to the discovery of some injuries to which the Pelvis and lower extremities are occasionally exposed. But its utility is of still more considerable extent. For I will venture to assert, that a knowledge of this single point will explain to you, the most frequent cause of unsuccessful operations for the stone, will guard you against similar errors, and open the road to improvements in some of the most delicate and most difficult operations which the Surgeon is called upon to perform. We shall not now enter into a detail of all the varieties in the position of the Pelvis, which depend on age or sex. We shall confine ourselves at present to the consideration of the changes induced in the position of the Pelvis of the adult male, by the different postures of the body.

Particularly in the recent subject.

Advantages derived from an accurate knowledge of the relative position of the pelvis.

Changes in position of pelvis caused by different positions of body. Direction of pelvis when body is erect.

Advantages of this direction of pelvis in erect posture.

When the body is erect, the Pelvis is so placed, that a line passing from the third lumbar vertebra, will fall nearly upon the superior edge of the symphysis of the ossa pubis. For in this position the cavity of the pelvis is projected so far backwards, that the ossa pubis become the part, against which the abdominal viscera press. You see therefore, that in those positions of the body, wherein these viscera could gravitate against the cavity of the pelvis, its oblique position protects it. And therefore, you will cease to wonder how it comes to pass, that the muscles of the pelvis so slight in texture, should be calculated to counteract the pressure of the abdominal viscera, and the action of the abdominal muscles and diaphragm. For, you now see, that it is the action of the Diaphragm only, which they are required to counteract; and by referring to the oblique position of this muscle, you observe, that the direction of its force in any other position (except when the body is bended forwards) is not to press into the pelvis, but against the lower part of the abdominal muscles.

Direction of pelvis in horizontal posture.

In children

When the body is laid horizontally, the axis of the pelvis forms with the axis of the body, an angle of nearly sixty degrees; but this angle is not invariably the same in all adults. In females, it is more obtuse than in males. In children, this angle is so extremely obtuse, that the axis of the pelvis, and that of the trunk, almost coincide, on account of the straight form of their vertebral column.

[illegible]

When the patient is laid horizontally, and the Pelvis raised, we find that in proportion to the degree of its elevation, the angle formed by the axis of the pelvis with that of the trunk, is rendered more and more obtuse, until at length, by a considerable elevation of the pelvis, the axes of both cavities are made to coincide.

The effects which other positions of the body have on the viscera contained in, and connected with the Pelvis, shall be reserved until we have spoken of the structure and attachments of each of these organs.

This one point, the direction of the axis of the pelvis being established, you will be ready to admit these inferences. That in extracting a stone from the bladder in the lateral operation, your patient being placed horizontally, you should endeavour to withdraw the forceps in the direction of the axis of the pelvis, and not in the line of the axis of the trunk. For in this last direction, the forceps and stone would be brought in contact with the arch of the pubis, by which the urethra and all the soft parts in the vicinity of this arch must be so severely contused, that this injury would probably terminate in the death of the patient. Nay, if the stone were large, it would be impossible for the Surgeon to extract it in this direction.

The influence which the position of the Pelvis has on Catheterism, and the operation of Lithotomy, will be mentioned after the Organs of Generation have been described.

Contents of pelvis.

The Pelvis in the male, contains the bladder with its appendages, and the rectum.

Rectum.

The Rectum entering the Pelvis, descends along the anterior surface of the os sacrum, keeping, however, a good deal to its left side. Although this intestine be cylindrical and contracted in its upper part, yet we always find it dilated in that portion which is behind the bladder, between it and the anus: so that there a sort of sac is formed, the mouth of which is shut by the muscles of the anus. (This dilatation is more evident in adults than in children, however it will be found in children, except those of one or two years old.) Therefore the rectum above its sphincter, does not form a cylindrical cavity, but a flattened pouch, of which the part next to the bladder is longer—the opposite part is the shorter. Hence it is plain, that the intestine cannot be moved from its place by the finger being introduced into the anus, and therefore this proceeding is not sufficient to secure this intestine from being wounded in the lateral operation of lithotomy; nor can we facilitate the introduction of the catheter into the bladder, by attempting with the finger introduced per anum, to draw down the rectum.

Dilatation of rectum.

Effects of this form in lithotomy.

On passing Catheter.

Conect of peritoneum with rectum.

Carefully observe the relations of the rectum and the peritoneum. In some cases you will find this membrane completely surrounding the gut, and attaching it to the sacrum, by a sort of mesentery, which anatomists have termed Meso rectum. In general, however, the peritoneum covers only the anterior half of the circumference of this intestine, and consequently binds it firmly to the os sacrum. Nor does the peritoneum afford this partial covering to the entire of the length of the intestine For having descended on the gut, so low as to be nearly on a level with the upper extremities of the vesiculæ seminales, it is then reflected from it to the posterior surface of the bladder. Thus a considerable length of the rectum is left uncovered by the peritoneum, between the place of its reflection and the anus. This therefore is the only part of the gut which can with safety be divided in the operation for fistula in ano. Judge then, whether we are to consider as improvements, those instruments, or directions which would enable us to divide this intestine so high up as to reach the part where it is covered by peritoneum. Consider well the risque you would thereby run, of cutting through this membrane, and thus laying open the cavity of the abdomen. Nor is the subsequent peritoneal inflammation the only evil to which the patient is exposed, by such incisions. The internal hæmorrhoidal artery is also liable to be wounded, where it is yet of considerable size. It is scarcely necessary to add, that the hæmorrhage from such a wound, will be more serious when the incision is made in the posterior part of the intestine, along which the undivided trunk of the artery takes its course.

What parts are not connected with peritoneum.

This part only should be cut in operating for fistula in ano.

Lest abdomen be opened.

And internal hæmorrhoidal artery.

Hæmorrhage from this not always made externally.

The Hæmorrhage in these cases, is not always manifested by a discharge of blood externally. For it sometimes happens, that the sphincter ani performs its office so perfectly, that while some considerable branch of the hæmorrhoidal artery, which has been wounded, pours its blood freely into the cavity of the intestine, not a drop of it is allowed to escape externally. The accumulation of blood in the lower portion of the gut, produces an irritation on the neck of the bladder, with frequent and unavailing attempts to pass urine. At length, the over-distention of the gut causes such an irritation, that the patient is seized with an irresistible desire of going to stool. By this, the the entire of the accumulated blood, is suddenly discharged, and the patient is seized with an immediate fainting.

Consequences of this.

Fistula in ano sometimes caused by a foreign body, which had been swallowed

This disease of Fistula in Ano, is sometimes induced by the presence of some solid body, which having been swallowed by the patient, had passed along the internal canal, without causing much irritation. At length, entering into the rectum, it there begins (from what cause is unknown) to excite irritation; this sometimes ends in ulceration of the coats of the intestine, by which that extraneous body is removed from its cavity. And now lodging in the cellular substance, which surrounds the extremity of the rectum, it there excites a constant suppuration. In one case of this kind, I found on laying open the sinus, that a long piece of the bone of a goose's wing lay transversly in the buttock. In another case, I saw Mr. Obre, extract a small round stone. This latter case was not preceded or attended by any urinary distress, and the patient got well in the ordinary time after such an operation.

Prolapsus ani.

The lower end of the Rectum is subject to an inversion through its extremity, where it is surrounded by the sphincter ani. This has been improperly termed Prolapsus ani. For the anus or lower extremity of the rectum, remains unmoved from its situation, and unaltered in its connexions with the surrounding parts. It is, in fact, the portion of the gut immediately above its termination, that descends in an inverted state through the anus. This inverted portion in time, increases in length. It is capable of being returned, but is however, generally found to descend again on the patient's straining to stool, and sometimes even on his using any bodily exertion. This state of the gut is often attended with a very remarkable circumstance. The patient cannot discharge the fœces, unless he suffer the bowel to come out. This Morgagni attempts to explain in the following manner:

How produced.

Remarkable circumstances in this disease.

How accounted for by Morgagni

"It remains, therefore, that the relaxation of the intestine must be supposed so considerable, that descending when pushed down by the excrements, in a great number of large rugæ laid one upon another, it forms something like a valve; especially as often as being retained by any kind of artifice, it cannot altogether extend and unfold itself, and by this means give an open passage to the excrements."

Prolapsus ani not caused by relaxation.

This disease so frequent in children, has been ascribed to relaxation of the sphincter ani alone, or to a relaxation of this muscle, combined with a relaxed state of the levatores ani. But to this opinion we shall feel some reluctance to subscribe, when we reflect that we have not only no proof adduced, of the existence of this state of relaxation in the muscles of the rectum; but that in cases of paraplegia, where extreme weakness of all the muscles of the lower extremities and lower part of the trunk takes place, and even continues for years, we yet cannot observe any appearance of prolapsus ani manifesting itself, during any part of this period. In fact, the disease termed prolapsus ani, is strictly an introsusception of the rectum. In confirmation of this, we find that in many instances, it has been induced by some irritation of the upper portion of this intestine. I have lately had an opportunity of examining this disease, in two subjects of about six years of age. In both, the protruded bowel was about two inches long. On opening the abdomen, the colon appeared natural, not at all stretched, without any appearance of its having been drawn down into the pelvis. The mesorectum with the internal hæmorrhoidal artery appeared tense, and as if drawn into the prolapsus.

Obejctions to this opinion.

It is a true introsusception of the intestine.

Appearances on dissection.

On cutting through the outer fold of the prolapsus, the branches of the internal hæmorrhoidal artery were exposed to view, and were easily traced; the subject having been previously injected. The external adhered, though not very closely, to the internal fold of the prolapsed intestine.

The finger was more readily passed through the prolapsed intestine, when entered from above, than when introduced from without. By pulling the mesocolon upwards, the prolapsus was much shortened, and then it was obvious that the portion of the gut which had been thus disengaged, was of a purple or red color. This color did not extend to a higher part of the intestine. However, some slight marks of inflammation were perceptible in distinct patches along the gut, up as far as the colon. On drawing up and cutting open that part of the rectum, which formed the upper portion of the prolapsus, a number of small, distinct, round, white ulcers were seen. These were as thickly set as they could well be, or as thick as apthæ appear on the tongue.

The Colon on being cut open, exhibited many distinct ulcers of the same size and form; but not with the same white surface. Around some of them an increased vascularity denoted the existence of inflammation. The ulcers became less deep, and less frequent, and the mark of inflammation less strong, as you passed backwards towards the cæcum. No marks of inflammation were ob-

Frequency of this disease in children not caused by want of support. But by extreme irritability of bowels.

servable on the external surface of the small intestines. We may, therefore, call in question the validity of that opinion, which ascribes the frequency of this disease, in early periods of life, to the want of support from the os coccygis. Will not the extreme irritability of the bowels, at this early period of life, account for the greater frequency of this disease in children?

The cure of this disease, is therefore, not to be sought for in mechanical contrivances, for preventing the descent of the intestine. It is rather to be looked for in those means which remove or diminish the causes of irritation in the bowels.

Imperforated anus

Varieties of this disease.

Children are born sometimes with the defect of an Imperforated Anus. In some instances, while there is no passage for the fœces in the natural direction, they are capable, notwithstanding, of being discharged from the body. For the extremity of the gut opens into the vagina in females, and into the urinary bladder in males. In other instances there is no outlet whatever for the fœces, the intestine terminating by a blind extremity, which in different cases lies at different depths in the pelvis, or along the sacrum. Sometimes the gut descends so low, that its extremity is covered only by the cutis, or by a membrane of no great thickness. The precise nature of such cases will be indicated by a fullness and tension of this membrane, in consequence of the pressure of the meconium against it. Here an incision made

Frequently depends upon the irritation [illegible]
[illegible] the [illegible] young [illegible]

In what case operations will be successful.

through this membrane will be perfectly safe, and uniformly successful. In other instances, where there is no outlet for the fœces, and where the intestine terminates higher up in the pelvis, the Surgeon will feel himself called on to make some effort for the preservation of the child. He will therefore make an incision through the integuments, at the spot which the wrinkled and folded appearance of the skin, indicates to be the natural situation of the anus, ; he will then carry his instrument deeper and deeper into the pelvis. These incisions he will carry on in a straight line, because he knows that the intestine as far as it reaches, lies on the face of the sacrum, and that the bone is perfectly straight at this period of life. He will feel less hesitation in making those very deep incisions, by recollecting that the bladder does not press backwards on the rectum; but when distended rises, of a pyriform shape, into the abdomen. Therefore he is not in great danger of wounding this viscus, after his knife has passed beyond the region of the prostrate gland.

Operation when the gut does not descend near to anus.

Bladder how secured by its form.

It is to be observed, that in some cases of male infants, although a communication of the gut with the bladder, be manifested by the discharge of a small quantity of fœces along with the urine, yet the condition of the child is not less deplorable, than if no such communication existed. For the quantity of fœces which is discharged in this way, being very inconsiderable, the infant suffers the same distress, as if no outlet whatever had been given.

By the following extract from Morgagni, we may learn how feeble should be our hopes and how guarded our prognosis in all cases of imperforated anus.

Prognosis should be guarded.

"Sometimes by introducing the finger per anum, for some little space, which is sufficiently pervious, the Surgeon naturally conceives the hopes of a successful incision, as if nothing but a kind of membrane, which was interposed, cut off this communication with the upper part of the rectum; and yet this remaining part is in fact no where: but the other rectum is an intestine, which being full of fœces, is inflected at a considerable distance from the anus to the upper part of the os sacrum, and being shut up and firmly connected to that part, terminates there. For sometimes the rectum has in the whole extent of it no passage at all, but is solid like a rope; and sometimes even the whole of this intestine is wanting. Wherefore, when any other passage is sufficiently open, although attended with great inconveniencies; and it is not certain, that the rectum comes down so far between the buttocks, that its canal is covered only by the cutis, or a membrane of no great thickness; we must not search in that part for what, perhaps, terminates in some other place, as for instance, in the upper part of the vagina. For unless the incision penetrates thus far it can have no effect in removing the complaint; and if it does really penetrate thus far, two other dangers remain behind, besides that of hæmorrage or convulsions. One of which is lest the passage formed by nature into the vagina, may never be quite closed up, notwithstanding the incision: and the second, lest that which is opened artificially by another way, should from the want of a sphincter to shut up the orifice not remove, but double the inconvenience.

But if there be naturally no exit at all to the abdominal fœces, a doubtful method of cure ought to be preferred to the certain death of the infant."

ANATOMY OF THE EXTERNAL ORGANS OF GENERATION.

IT is unnecessary for me to remind you that the penis is composed of two cylindrical bodies, the corpora cavernosa, which, arising from the rami of the ischia, join together at the lower edge of the symphysis pubis to constitute one body, terminating at the base of the glans. The body of the Penis constructed thus of two cylinders applied to each other must, of course, have along the line of their union two grooves, one on its upper, the other on its lower surface. In the former of these the trunks of the blood-vessels and nerves are situated. The lower is occupied by the canal of the urethra. This canal, designed for conveying the urine from the bladder, is surrounded in the greatest part of its course by a cellular texture, replete with blood, and called its corpus spongiosum.—This commences in the perinæum by a bulbous swelling, and terminates anteriorly in that dilatation called the glans penis. The remaining part of the urethra, between the bulb and neck of the bladder wants the corpus spongiosum; a portion of which, in the immediate vici-

Structure of penis.

Of urethra

mity of the bladder is surrounded by the prostate gland. What remains of the canal between the anterior point of the prostate gland and the bulb of the corpus spongiosum is termed the membranous part of the urethra.

We shall now proceed to a more particular examination of the structure of each of these parts.

Prepuce, structure of.

The skin is connected to a ligamentous covering of the corpora cavernosa penis by cellular substance destitute of fat; and is continued over the glans without being attached to it. Having reached to the point of the glans, it turns inwards, and terminates by attaching itself to the body of the penis immediately behind the base of the glans. Between the internal and external portion of skin, thus forming the prepuce, a quantity of cellular substance is interposed.

Ligamentous tunic of penis.

Suspensory ligament of penis.

On raising the skin, we find a ligamentous membrane, which invests the penis, and which is derived from the suspensory ligament. This ligament begins about an inch and a half above the pubis, by an origin of nearly an inch in breadth.—It becomes more thick and raised as it passes down over the pubis, and is so wide that some of its outer fibres are blended with the fascia lata of the thigh, and yet is not sufficiently wide to cover the abdominal rings. It terminates on each side close to the rami of the pubis, by being blended with the fascia, covering the adductor muscles of the thigh. This ligament where it lies on the abdomen, does not possess a perfectly ligamentous texture; for here it is blended with a considerable portion of fatty substance. From the abdomen it descends along the symphysis pubis, to which it is very firmly fixed. Here it assumes a perfectly ligamentous texture. This ligament, adhering by its upper edge to the symphysis pubis descends and fixes itself by its lower edge to the dorsum penis; but it does not cease here, for it can be traced, expanding itself over the crura of the penis, and the urethra until it terminates at the base of the glans, thus constituting one of the envelopes of the penis.

Structure of prepuce explains the effects of anasarca on it.

From the structure of the prepuce, constituted of two layers of skin, with a quantity of cellular substance interposed, we can easily explain the alterations which this part undergoes in cases of anasarca.

For the fluid distending the cellular substance will not only contract the orifice of the prepuce, but by elongating the skin beyond the glans, will cause this unsupported part to assume a tortuous form.

Inconveniencies of this.

This elongation and distortion of the prepuce is sometimes productive of no inconsiderable obstacle to the discharge of urine. The obvious remedy for this inconvenience is, occasionally to introduce into the orifice of the prepuce, a bit of prepared sponge or other substance, which expanding, will

How to be remedied.

enlarge this opening. It is scarcely necessary to remark, that in these dropsical habits of body, any attempt to unload the cellular substance by puncturing the skin, is attended with much risque.

Chancres producing fistulæ.

It too frequently happens that chancres seated behind the corona glandis, are attended with inflammation and suppuration, which pass backward along the dorsum penis. These present a small ulcerated surface behind the glans, from which a considerable discharge flows, particularly when pressure is applied to the body of the penis. The seat of such inflammation is under the ligamentous covering of the penis. Sometimes the matter not only burrows under this covering, but even passes up to the pubis, and there forms an abscess, which ultimately opens externally. Your knowledge of the origin and extent of this fascia will explain why the inflammation takes this course. When the abscess happens to be seated under the thicker portion of this ligament, near to the linea alba, and there opens externally; you might imagine from its depth, that it was seated among the abdominal muscles or even under them. This portion of the ligament is here naturally so thick, and this thickness is so materially increased by the previous inflammation, as to cause this deception.

Seat of these.

Sometimes pass up on pubes.

Their course accounted for.

Depth when they open near to linea alba.

Sometimes injure the functions of the penis.

In some few cases, where these abscesses along the penis and pubis, have been numerous and long continued, it has happened that, on their healing, this fascia has been so contracted as to produce distortion of the penis when turgid. In such instances, the thickened and contracted state of this ligamentous covering keeps the penis drawn up towards the abdomen. This distressing effect I have known spontaneously to wear off, after considerable lapse of time. It admits however, of a more speedy remedy: for this purpose, let an incision be made through the hard ridges formed in this fascia, and let the edges of the wounds be kept separate by interposed dressings.

How to be remedied.

In cases of chancres, where rapid ulceration has seized on and destroyed the glans penis, we observe that during the progress of ulceration, the prepuce inflames, becomes thickened, and incapable of being retracted. When the ulceration ceases, the prepuce becomes less thick; and now admitting of retraction, presents the following appearances:—

Effects of destruction of glans penis by chancres.

The skin of the prepuce is seen covering and adhering to the extremity of the penis, so as to leave only a small opening corresponding with that of the urethra. The circumference of this opening is much less than that of the healthy urethra: so that a considerable obstruction is given to the flow of the urine, even at this early period of their adhesion. We remark also, a very alarming tendency in this small orifice, to contract itself still more every day, so as to threaten a complete obliteration of the extremity of this canal. This tendency to contraction, appears to be communicated to the

Prepuce adheres to opening of urethra.

Tending to narrow the orifice.

other parts of the canal, and thus give rise to strictures of the urethra. A similar union of the integuments to the surface of the stump, takes place after amputation of the penis, and is followed by a like tendency to contraction, and the formation of strictures. Hence we may call in question the propriety of that rule which directs us in this operation to retract the skin, in order that we may save as much of it as will be sufficient to cover the end of the stump.

Also gives rise to stricture.

Similar consequences after amputation of penis

The strong membrane which forms the walls of the corpus cavernosum penis, sometimes yields so as to produce a swelling analogus to aneurism. From a knowledge of the structure of the penis, we are prepared for those symptoms which characterise this affection, and which have been so accurately laid down by Albinus, in the history of the case which he relates. The tumor is rather soft, and the skin which covers it, is as moveable on that as on the other part of the penis. While the penis is flaccid, the tumor is smaller and softer, and becomes larger and harder during the state of erection.

Aneurismal dilatation of corpus cavernosum penis.

Symptoms of it.

In the early part of the disease, the tumor readily subsides on the application of pressure; in the progress of the complaint it subsides less easily and less perfectly. This disease has been mistaken for an abscess, and opened by the Surgeon. It is scarcely necessary to say, that an attention to the preceding history, together with the want of discoloration of the integuments, and of the pointed form so characteristic of abscess, will enable us to avoid such dangerous mistakes.

Scrotum.

The Scrotum is composed of the skin, under which is found a thin layer of cellular membrane. This envelopes the dartos, which many suppose to be of a muscular nature. Between the dartos and testicles is found a cellular substance of a very loose texture. This surrounds the testicle in such large quantities as, by facilitating its change of place, enables this gland to elude the effects of blows, or other external injuries. We observe a great number of veins, and some of these of a large size, distributed among the various layers of which the scrotum is composed.

Effects from wounding any large vein.

By attending to the vascular condition of the Scrotum, you may judge what effects are likely to follow, when one of its large veins are cut in the operation of tapping a Hydrocele of the Tunica Vaginalis Testis. For when you have closed the anterior part of the wound by sticking plaister, the blood may still flow from the wound in the opposite or posterior surface of the vein, and may insinuate itself widely among the cellular substance of the scrotum. This will produce a swelling of the scrotum, of a black or livid color, assuming much of the appearance of gangrene.

Large hydrocele burst by external violence.

Next, you will readily see how it happens in cases of old and large hydroceles, that by a blow on the scrotum, the tunica vaginalis testis shall be burst, and the water of the hydrocele effused into the cellular substance of the scrotum. As this must be accompanied by rupture of some vessels of the skin and tunica vaginalis, the case will be complicated with effusion of blood. The swelling thus produced, will assume much of the character of gangrene, but not any of the dangers. For the effused fluid will be gradually absorbed, and the bulk of the parts reduced nearly to the natural standard, while the rent in the tunica vaginalis testis, will unite again, and the sac be again rendered capable of holding the water which still continues to be secreted, into it, and thus the disease will again be renewed.

The structure of the Scrotum will also enable you to foresee the enormous size to which it may be distended, in cases of anasarca, and to which it is particularly subject, by its low and pendulous situation. This structure too, will enable you to judge of the facility with which ingenious impostors blow up the scrotum, for the purpose of counterfeiting ruptures. For by a blow-pipe introduced into a very small opening, made in its posterior part, the entire of one side of the scrotum is readily inflated, and the part assumes many of the appearances of Inguinal Hernia.

ANATOMY OF PERINÆUM.

Perinæum.
Mode of dissecting it.

NOW proceed to dissect the Perinæum. Raise the skin of the Perinæum, extending the dissection beyond the tubera ischii to the thighs. This exposes to view a strong fascia, which, on dissection, will be found to cover the entire of the perinæum, and to blend itself with the structure of the scrotum. This fascia, although on a superficial view it appears continuous with the fascia of the muscles of the thigh, will yet be found, on closer examination, to attach itself very firmly to the rami of the ischium and pubis. The texture and connexions of this fascia, will serve to explain many of those phænomena, attendant on the effusion of urine into the perinæum, by rupture or ulceration of the posterior part of the canal of the urethra.

Fascia of Perinæum.

Influence it has on effusion of urine.

First, Then you will find that this fluid, when so effused, although it forms a tumor in perinæo, rarely terminates by suppuration and ulceration in this spot; being here resisted by the dense and unyielding texture of the fascia, diffusion laterally towards the thighs, is prevented by the close attachment of this fascia to the rami of the pubis and icschium; while its progress forwards, is favoured by a quantity of cellular substance, interposed between the surface of the perinæal muscles and this fascia. In general, then, we find that the urine having caused some tumefaction in perinæo, passes on into the scrotum. Here meeting with only a very feeble resistance from the lax texture of this part, it quickly distends it to a very considerable size. In some instances the mischief does not extend further, for suppuration takes place in the scrotum, and a quantity of very fœtid fluid, composed of urine and pus, is discharged as soon as the abscess spontaneously bursts, or is opened by the Surgeon. In other cases, the effused urine continues its progress until it arrives at the pubis. Here it causes a swelling, which becoming red, tense, and painful, at length ulcerates; and giving exit to a large and fœtid discharge of urine mixed with pus affords some relief to the patient. As often as the patient attempts to pass urine, some of it filters through this opening. In process of time, considerable sloughs of cellular substance are drawn out through it. After this the swelling subsides, the orifice contracts, and the disease terminates in an urinary fistula.

Phænomena of such effusion.

Distention of scrotum

Ulceration of pubis.

In some cases, besides the opening on the pubes, an extensive gangrene seizes on the integuments of the perinæum or scrotum. During the progress of this local mischief, the constitution of the patient suffers very materially. He is from the commencement afflicted with severe pain, and some degree of

Constitutional symptoms.

fever. By the continuance of this, his life is brought into imminent hazard.

Most of these evils obviated by an early opening

By making an incision into the Perinæum, in the early stage of the disease, the patient will be saved from many of these evils; the painfullness of the disease will be diminished; the period of its continuance shortened; and the ravages of the malady confined within much more narrow and circumscribed limits.

Influence of this fascia on abscess of in perinæo

In cases of abscess in perinæo, the dense, texture, and unyielding nature of this fascia, will prevent the fluctuation from being sensibly felt, and will also retard the spontaneous discharge of the matter. An early opening made into the abscess, is therefore necessary, to free the patient from the protracted state of suffering, which the confinement of the matter in this situation will cause.

Dissection of perineum continued.

Before you raise this superficial fascia of the Perinæum, it may be of use to make a transverse incision through it, midway between the tuberosities of the ischium and the arch of the pubis. This incision will enable you to see the muscles of the perinæum, lying in their natural situations. From this view you observe, that these muscles are closely joined to each other, that no interval exists between the erector penis and the accelerator urinæ. Hence you learn that it is not possible to make your incision in the lateral operation for lithotomy, so as to avoid wounding some fibres of the erector penis, or accelerator urinæ. However, these muscles will

No interval between the muscles of perineum.

only be wounded in the direction of their fibres, so that the capability of performing their respective offices will not be materially injured. Proceeding in the dissection, now remove the superficial fascia of the perinæum, and then clear away some cellular substance covering the muscles, so as to give a distinct view of them. Next remove these muscles, taking care not to cut another fascia which lies under them, and which we shall presently examine, under the name of the anterior layer of the triangular ligament of the urethra, or membranous septum of the perinæum.

Dissection continued.

The Perinæal muscles being removed, the bulb of the Urethra is exposed to view. This, you observe, has its anterior part corresponding to the angle of the pubis, from which it extends backwards on the perinæum, so as to reach nearly to the anus. In this course it gradually swells into that bulbous extremity which lies near to the rectum. Press the bulb of the urethra a little to one side with the handle of your knife, and then observe more accurately, the attachment of this layer of the triangular ligament of the urethra. It is seen to fix itself to the anterior edge of the arch of the pubis, to continue its attachment to the rami of the ossa pubis, and to the rami of the ischia; the place of its attachment being behind that of the crura penis to the same bones. On this ligament we observe the bulb of the urethra to rest, and we shall find in the septum, a hole for transmitting the membranous part of this canal.

Bulb of urethra.

Its extent.

And form.

Triangular ligament of urethra. Its attachments.

Bulb of urethra lies on it.

How to discover the hole by which it transmits the membranous part of urethra.

The following dissection will enable you to discover this opening, and to examine more satisfactorily the anterior layer of the triangular ligament of the urethra. Cut across the urethra at the distance of an inch anterior to the arch of the pubis. Separate it carefully from the corpora cavernosa penis, and turn it down on the perinæum. In doing this, you must avoid cutting the parts too close to the anterior surface of the symphysis pubis, lest you cut away the upper end of this ligament, in subjects where it is but thin and weak. By this proceeding, you discover that the edges of the opening for transmitting the urethra, are continued onwards upon the surface of this canal to a small distance. This attachment requires to be separated by the knife; for it is this which prevents us from seeing a regular well-defined border to this opening. The bulb of the urethra does not lie loose and unconnected upon the surface of this ligament. On the contrary, you find it to be fixed in this place, and connected with the anterior surface of this ligament, by an attachment of an almost ligamentous nature; so that even the largest and most posterior part of the bulb, although it pass backward towards the anus, cannot be said to lie loose or pendulous in the perinæum. Since then the membranous part of the urethra lies so much nearer to the arch of the pubis, while the bulb passes so far backward in the perinæum towards the anus; and since our incisions in

How the edges of this opening are disposed of.

Bulb of urethra connected with this ligament.

Why bulb is so liable

lithotomy, should begin at the seat of the membranous part of the urethra, it follows that we are in danger of wounding the bulb, as we carry our incision downwards between the tuber ischii and anus. As it is adviseable that in lithotomy, our division of the urethra should commence on the membranous part; and as it will afford us much satisfaction to have our judgment of the depth at which this lies, guided by some certain rule, we should carefully study the depth at which the opening in the triangular ligament lies from the surface of the perinæum.

to be wounded in lithotomy.

Advantages of knowing the depth at which the triangular ligament lies.

We should also carefully observe the height at which the aperture in this ligament is situated. Mark that it is not immediately under the arch of the ossa pubis, but about an inch below it. A strong ligament occupies the space between this opening and the inferior edges of these bones.

Place of opening in triangular ligament.

This ligament, which may be called the Pubic ligament, lies between the layers of the triangular ligament of the urethra. It is about half an inch deep, having its lower edge thick and perfectly straight. This ligament is of great strength, and thickness. Hence it is obvious that the membranous part of the urethra does not lie close to the lower edge of the symphysis pubis; its course is half an inch below this edge.

Pubic ligament.

Very slight reflection will convince us that much difficulty must occur in making the catheter or

Whence difficulty of passing

catheter into membranous part of urethra.

sound enter into the anterior part of the membranous portion of this canal, as it is not only surrounded by the edges of the aperture in the triangular ligament, but also lies under the edge of the pubic ligament.

Point of catheter is not pressed against pubis.

It is against this ligament, and not against the pubis, that the end of the catheter is pressed, when, in attempting to introduce it, the point of the instrument is turned upwards too early.

Resistance of pubic ligament in lithotomy.

If in attempting to extract the stone, we should withdraw the forceps horizontally, this firm ligament will oppose a very considerable resistance to its extraction.

ANATOMY OF THE PELVIS—BLADDER.

Bladder.

Its form when empty.

NOW turning your attention to the Bladder, observe well its form and place. When empty, it presents the form of a flattened oval, its dimensions from side to side being greater than from front to back. The lower and posterior part of this viscus swells out into a sort of pouch, which rests on the rectum. The upper and round end has been called the fundus of the bladder, the middle part, its body; and the lower part, its base; the lower part has been subdivided into two, the posterior large and capacious, called the base or lower fundus, and the anterior part narrow and of a funnel shape, called the neck of the bladder. When empty, it lies within the pelvis; the upper edge of the ossa pubis being on a level with, or above its fundus; the anterior surface of the bladder being connected to the internal surface of these bones, by a loose cellular substance. When the bladder is distended with urine, the increase of the capacity is greater at its fundus and base than in its body.

How affected by distention.

In a state of distention, the fundus of the bladder rises above the pelvis; its anterior surface lies in contact with the recti muscles of the abdomen, while its base descends and rests on the rectum, by a broad triangular surface.

How connected with peritoneum.

The peritoneum is connected with the bladder in the following manner: This membrane leaving the recti muscles of the abdomen, meets and adheres to the fundus and edges of this viscus in its contracted state, passes down on its posterior surface, closely adhering to it, until it descends so low as the upper extremity of the visiculæ seminales; here leaving the bladder, it passes backwards to cover the anterior surface of the rectum.

As it is a matter of great moment to the safe performance of some operations on the bladder, that you pos ess a clear idea of the relations of the peritoneum to it posteriorly, you should examine their connexions here, with great care This will be done to most advantage, by the following dissection.

How to obtain best view of this connexion.

Turning the subject on its face, raise the glutei muscles from the surface of the sacrociatic ligaments, cut out the lower half of the sacrum, together with the os coccygis; but do not separate this latter from its connexions with the rectum: cut this intestine across at the lower edge of the remaining piece of the sacrum, lay back the intestine, and carefully raise the peritoneum from its anterior surface. Now stretching the detached peritoneum, you will gain a most satisfactory view of the place, and line of its attachment to the bladder.—You see that the peritoneum having descended to the upper end of the vesiculæ seminales, on each side, attaches itself there while it descends lower in the interval between these bodies: so that its inferior connexion is by a semicircular line, the convexity of which looks towards the neck of the bladder. This stage of the dissection enables you to obtain a most useful view of the relative situation of the vesiculæ seminales to each other, and to the prostate gland. From it you learn, that the vesiculæ seminales lie more parallel, and more close to each other than is generally imagined; that they lie in contact with each other for some length, before they reach the prostate gland, that in the interval between them, the peritoneum descends very low towards the base of the prostate, and that consequently, a small portion only of the bladder remains naked, included between the vesiculæ seminales, the lower attachment of the peritoneum and base of the prostate.—Examine now the depth at which this naked part of the bladder lies from the anus, and then judge whether it be probable, that in puncturing the bladder from the rectum, the instrument can be unerringly entered at this spot, or whether it be not more

Relative position of vesiculæ seminales.

Small portion of posterior part naked

Objections to puncturing the

bladder through the rectum

probable that it will be pushed through the anterior extremities of the vesiculæ seminales, where they lie in close contact with, and parallel to each other. Does not the pain which is felt in the glans penis, at the moment of the puncture, tend to strengthen this suspicion? Should the operator, from solicitude to avoid the vesiculæ seminales, pass the trocar still higher up in the rectum, he must then be in considerable danger of wounding the peritoneum.

Distended bladder may be cut into above the pelvis.

It is scarcely necessary to say, that you can now form an opinion of the length of incision, which may be safely made in the lateral operation of lithotomy, into this back part of the bladder, from the membranous portion of the urethra.—When the bladder in its distended state, rises above the pubis, its anterior surface being applied to the recti muscles, it is plain, that an incision may be made into these muscles, without the peritoneum being endangered, provided only, that the bladder ascend high enough above the pubis.

Now separating the peritoneum from the walls of the pelvis, and with the handle of the knife scraping off some loose cellular substance, you expose to view a fascia which merits your particular study.

To lay down a plan of dissections which will enable you to obtain a knowledge of the extent, relations, and uses of this fascia, is all that I can pretend to do at present. No verbal description can possibly convey a clear idea of this structure: and to add such a number of plates as would be necessary to elucidate a description, would raise the price of this work, so as to put it beyond the reach of pupils.

Fascia connecting the bladder to the walls of pelvis.

First, Observe the extent of this fascia; it is seen to line the walls of the pelvis, from the sacro-sciatic notch forwards to the edge of the symphysis pubis. It descends from the ileo-pectinea line, to about midway in the depth of the pelvis: here it is reflected from the surface of the muscles, and applies itself to the prostate gland and bladder; on the body of which it is ultimately lost. At the angle of its reflection, this fascia appears particularly strong and white, but becomes more weak and thin, as it lines the muscles and covers the bladder.

Manner of its connection to the ossa pubis

This fascia fixes itself into the edge of each os pubis, on the side of the symphysis, and at a very little height above the lower edge of these bones. This attachment is made by a pointed production of the fascia inserting itself into the bone: and these productions of the fascia, from their form and greater thickness, having particularly excited the attention of anatomists, had obtained the name of anterior ligaments of the bladder.

Anterior ligaments of bladder.

Former descriptions of these erroneous.

The descriptions given of these ligaments of the bladder, you must now be convinced, were not drawn from the parts lying in situ, but as they appeared when detached. So completely does this fascia connect the bladder to the walls of the pelvis, that it is not interrupted in the interval, between what were called the anterior ligaments of this viscus. For here we see this fascia passing from the bladder, so far forwards under the symphysis pubis, as to form a small recess or pouch, capable of receiving the end of the little finger. Now, as this production of the fascia advances so far forwards under the symphysis pubis, it must approach close to that which I have termed the pubic ligament. We shall find, however, that it is separated from this ligament by the interposition of some veins, which take their course in the small interval left between these two ligaments.

This fascia forms a pouch under symphysis pubis

and here lies close to pubic ligaments.

By it the neck of bladder prostate and membranous part of urethra are closely bound to arch of pubis.

This first veiw of the fascia will lead you to suppose, that the membranous part of the urethra, the prostate gland, and neck of the bladder, are held closely connected to the symphysis and arch of the pubis. This opinion will be most strongly confirmed by the next plan of dissection.

Rules for proceeding in the dissection.

To make this in the most satisfactory manner, you must saw through both ossa inominata a little above, and behind the acetabula, and cut down to the middle of the sacrosciatic notch, still retaining the rectum and os coccygis attached to the bladder, and leaving the levator ani untouched. By making this section, you have an easy access to the deepest part of the cavity, and you enjoy the benefit of examining the connections and extent of the levator ani muscle.

Now proceed to raise the fascia from the internal surface of the levator ani. For this purpose, make an incision through this membrane, from the symphysis pubis back to the sciatic notch, and about half an inch above the place of its reflection; carefully separate the fascia from the surface of the muscle, as low down as you can.

Levator ani.

You now observe that this muscle has, as is generally described, a very wide origin, commencing on the side of the symphysis pubis, and running round till it arrives at the spinous process of the ischium. But the termination and the relations of this muscle deserve your serious attention.—In order that you may obtain a satisfactory view of them, it will be necessary to dissect carefully its outer surface, or that which looks towards the perinæum. You find a quantity of fat and cellular substance filling up the space interposed between the edge of the glutæus maximus and the levator ani—a thin fascia more immediately covers the outer surface of the levator. Having carefully removed this fascia, and cleared away the fatty substance which lies on the muscle, you see the posterior portions of these muscles from the opposite sides join together, and constituting but one muscular band, which passes behind the rectum; while the largest and most posterior fibres are ultimately attached by a tendinous insertion into the lateral parts of the os coccygis.—The portions of these muscles which descend by the sides of the

How its posterior part ends.

How middle fibres end.

rectum, are said to terminate by uniting with the sphincter ani; however, these fibres rather insert themselves between the upper edge of the sphincter and coats of the intestine, being more closely connected with the latter.

How its anterior fibres end.

The most anterior fibres of the levator ani, pass down before the rectum, and are ultimately connected with the perinæal muscles, at the place of their common junction, behind the bulb of the urethra. We remark, that these anterior fibres do not descend perpendicularly from their origin, to reach the perinæum; but proceeding downward and backwards for the space of one inch and a half from the symphysis pubis, loose considerably of their muscular appearance when they arrive at their termination.

These muscles then, while they allow the rectum to pass down between them, are united to each other, both behind and before this intestine; and hence they have been said to close the lower aperture of the pelvis. But as we have seen that they extend from the os coccygis, only to the posterior part of the bulb of the urethra, it is obvious that they do not close the anterior part of this aperture. It is therefore necessary for us to examine how the interval between the arch of the pubis, and the anterior edge of these muscles, is occupied and secured. This can be more satisfactorily effected, by cutting through the levatores ani transversly, about half an inch below their origin, and then raising the lower divisions from the fascia upon which they had lain.

This exposes to our view that ligament which has been called the triangular ligament of the urethra, or the ligamentous septum of the perinæum. The important purposes which this ligament answers, require a particular study of its structure, extent, and connexions.

Triangular ligament of urethra.

Let us first examine it as seen from the pelvis. This ligament then is attached to the arch and rami of the ossa pubis, descending along these bones, for the length of an inch and a half from the symphysis, and blending itself with the fascia which covers the internal obturator muscles. This portion of the ligament is consequently of a triangular form, the apex of which is at the arch of the pubis; the base stretching across the perinæum, behind the bulb of the urethra, is not rectilinear, but of a crescent form, the concavity looking towards the anus. Through an aperture in this ligament, the membranous portion of the urethra passes. This aperture is situated at the distance of one inch below the arch of the pubis, and somewhat less than half an inch above the lower edge or base of this ligament.

On the pelvic surface of this ligament, we cannot, without further dissection, discover the aperture for transmitting the membranous part of the urethra. In fact, this ligament does not merely present itself as a partition placed in the angle of the pubis, separating the pubis from the perinæum, and transmitting, through a distinct opening, the membranous portion of the urethra. On the contrary, we remark, that this ligament is continued from the place of this aperture, backward along the sides of the membranous part of the urethra and prostate; that it adheres very closely to the surface of this gland; and consequently, that it serves so to connect these parts to the ossa pubis, that they must follow the motions of these bones.—It is this production of the triangular ligament, which some anatomists have described as a strong membranous capsule, investing the prostate. It is this fascia, adhering firmly to the gland, which gives that resistance so sensibly felt, when we are dividing the prostate in the lateral operation of lithotomy.

Productions of the ligament.

Since this production of the triangular ligament is continued in a very tense state, over the sides of the membranous portion of the urethra, it is plain, that it secures this portion of the canal from being immediately affected by the action of the levatores ani. It appears probable, however, that this muscle, by its connection behind the bulb, can produce some effect upon the membranous portion of the urethra.

Along the lower edge of the triangular ligament, we observe an appearance of muscular fibres, which by their direction and attachments, answer to Winslow's description of the inferior prostatic muscles. These fibres are certainly not parts of the levatores ani; but it is not equally certain, that they are of a truly muscular nature.

Inferior prostatic muscles.

If we attempt in conformity to the custom of anatomical writers, to describe all these continous fasciæ, which connect the bladder and urethra to the pelvis, as productions of one and the same fascia, we might say, that the triangular ligament by its outer edges, is fixed into the rami of the pubis, and is there continuous with the ligament lining the obturator muscles; that the edges of the opening for receiving the membranous portion of the urethra, are produced backward along the prostate, and having ascended as high as the arch of the pubis, it there splits into two laminæ—one continuing its course over the upper surface of the gland and bladder—the other lining the upper portion of the levator ani muscle.

Hitherto we have, for the sake of perspicuity, described this ligament as consisting of one lamina only; but that portion which is stretched across the interval between the ossa pubis, and which separates the perinæum from the cavity of the pelvis, will be found to consist of two laminæ, very distinct from each other—the posterior being that which is visible within the pelvis—the anterior that which we have described as being produced

Triangular ligament consists of two laminæ.

What gives a muscular appearance to this ligament.

upon, and giving a firm position to the bulb of the urethra; between these two laminæ the strong pubic ligament is situated, and between these many blood-vessels run. These give to this ligament, when divided, some appearance of muscularity, pretty much the same with that appearance which the corpus pongiosum of the urethra presents, when an incision is made into its substance, and the blood removed with a sponge.

ON PASSING THE CATHETER.

THIS has long been considered as one of the most delicate and uncertain operations which the surgeon is called on to perform. It is, therefore, incumbent on him to make himself perfect master of the anatomy of the urethra and adjacent parts—to revolve frequently in his mind the connections of this canal, the course which it takes, the inequalities in its dimensions, and irregularities in its surface: without an intimate acquaintance with all these, he cannot be supposed to know what may be termed, the natural difficulties of this operation. To this study he should add an enquiry into those alterations in the dimensions or directions of this canal, which may be induced either by the disease of the urethra or of the neighbouring parts.

Difficulties of this operation.

Let us now take a review of all these points, for the purpose of ascertaining the manner in which each may affect the introduction of instruments into the bladder.

That portion of the urethra then, which lies anteriorly to the angle of the pubis makes, with the portion immediately in this angle an arch, the concavity of which looks towards the perinæum. From

Curvature of urethra.

this point, the canal begins to take a direction exactly the reverse of the former, for now it runs from the angle of the pubis upwards, behind the symphysis until it terminates in the neck of the bladder.

That curvature of the urethra then, which is formed anteriorly to the pubis when the penis lies flaccid on the scrotum, can be destroyed, and the course of this portion of the canal be reduced to a straight line by raising up the penis towards the abdomen. In other words, that part of the urethra which lies immediately under the arch of pubis is fixed, while all anterior to it is perfectly moveable; so that there is no difficulty in bringing the anterior moveable portion on a line with that which is fixed. In short, by holding the anterior part of the penis in a line perpendicular to the abdomen, we reduce the deviation of the urethra to a single curve, which commencing at the arch of the pubis terminates in the bladder, and has its concavity directed upwards.

You should now enquire how far the different connexions of the urethra and bladder will admit of any alteration in this curve. The membranous portion, then, immediately behind the bulb of the urethra, is secured in a fixed position, by passing through the triangular ligament of the urethra.—The prostrate gland also admits but of slight alteration of place, except at its base or posterior part. Hence it follows, that the instrument can be passed through the membranous and prostatic portions of the urethra only by giving to it a direction corresponding to that of the canal.

What are the inequalities in the dimensions and irregulaties in the surface of this canal, which can influence the method of passing the catheter?

Natural obstacles.

Mucous lacunæ.

The mucous lacunæ of the urethra are said to have occasionally presented such large openings, that the point of the catheter has passed into some of them. If such an occurrence had taken place, I presume it could have happened only when a very small instrument had been used.—The canal as it passes through the bulb, is somewhat dilated, and at this spot the instrument often is stopped. For if the point of the instrument be allowed to glide along the lower surface of the canal, it will enter into this dilated part, and cause great embarrassment to a surgeon unacquainted with the condition of this portion of the canal. For here the canal is not only more wide, but its course is such, that a straight instrument entered into it, will, if pushed on, pass into the perinæum, while that part of the canal which lies in the triangular ligament of the urethra, is situated much above it; or, in other words, the canal of the urethra, where it is covered by the bulb, forms a recess, or species of cul de sac, which is situated below, and even a little further back than the outer extremity of the membranous part of the urethra.—If, then, a catheter with the ordinary curve, be passed into this

Dilatations at the bulb

How introduction of catheter affected by it.

cul de sac, the surgeon cannot make it enter into the bladder without using very considerable force, and inflicting very unwarrantable violence. For, if he attempt, by raising the point, to push onwards the instrument, he must break through the interposed fold or projection of the urethra before he can enter the membranous part of this canal; and if he push on the instrument without elevating its point, he will force the instrument through the urethra at the end of this recess, and plunge it into the perinæum, or even into the space between the rectum and bladder.

That the instrument has passed between rectum & bladder how ascertained.

When the catheter has been unfortunately forced through the posterior part of the bulb, or beginning of the membranous portion of the urethra, it may be pushed on until it has sunk so deeply as to give to the bye-stander an idea that it has passed fully into the bladder. A surgeon conversant with this branch of practice, will be sensible that the instrument has taken a false route by the feel of resistances successively recurring, and by the absence of that sensation which he experiences when the instrument is passing along the smooth membrane of the urethra. Should he not be aware of the real state of the case, he will be convinced of his error, by the two following tests:—One is, the exquisite pain of which the patient complains whenever the surgeon attempts to depress the handle, and elevate the point of the instrument. This probably arises from the point pressing against the vesiculæ seminales.—The other means of detecting this error is, by introducing the finger in anum. For, when the catheter is lodged between the rectum and bladder, the prostate gland cannot be felt, except very obscurely; at the same time, the instrument is found to lie immediately upon the coats of the rectum. Should any opportunity occur to you in the course of practice of examining by the finger in ano, you will be surprised at the freedom with which the instrument can be moved in this newly-formed cavity.

How this accident to be avoided.

This natural difficulty at the bulb of the urethra, may possibly be in some degree surmounted, by drawing the penis forward, at the same time that the handle of the catheter is depressed. But from the fixed state of the membranous part of the urethra it cannot by such means be entirely removed. The only mode of effectually guarding against the disadvantage of such a form of the canal is to keep the point of the instrument slightly elevated, even before it has arrived at the bulb. By doing so, you may possibly enter into the membranous part of the urethra, without encountering any other obstacle; but this does not generally happen,—for this is the most critical step of the operation, viz. to pass the instrument from the bulbous into the membranous portion of the urethra. The triangular ligament of the urethra is of such firmness, that if the point of the instrument deviate even in

Great difficulty to enter into membranous part of urethra.

a small degree, from the axis of the canal, it will be felt to rub against the edge of the opening in this ligament, and then to pass on quickly. The sensation which this obstacle communicates to the surgeon, is similar to that experienced in passing through a stricture, and I fear that some mistakes have been committed in practice, owing to this sensation.—This point, which is six and a half or seven inches distant from the orifice of the urethra, has been represented by Mr. Home, to be the most frequent seat of this disease. This circumstance must have contributed to the number of those mistakes. I think it not improbable that the edge of the opening in the ligament might even make an impression on the point of a soft bougie, and thus render the mistake almost inevitable.

Obstacle here mistaken for stricture.

Let us return to the operation of passing the catheter. The obstacles then, which we have to encounter in this part of our course are the direction of the canal, and occasionally a contraction produced by the spasmodic action of the levatores ani. The former of these may be obviated by depressing the handle of the instrument, as much as will give to its point a direction corresponding with the direction of this portion of the urethra. The spasmodic contraction will best be overcome by keeping the instrument steadily in that spot where it is stopped by the spasm.

Obstacles in membranous portion of urethra.

In compliance with the generality of writers, who speak of spasm as one cause of difficulty in

Spasm supposed.

passing the catheter, I have mentioned it; and from seeing that this is the only part of the urethra where muscles can have any influence, I have supposed it to occur here. But I must candidly avow, that I have not, in a single instance, felt that sort of obstacle which I could safely ascribe to spasm of any part of the urethra.

Obstacles in prostatic portion

Morgagni's sinus.

Ridge formed by projecting fold of neck of bladder.

That enlarged part of the canal which runs in the prostate gland, or the prostatic sinus, as some term it, is next to be considered; and here more sources of difficulty are to be encountered than you might expect. For the point of the catheter, if small, may pass into that sinus described by Morgagni, as seated at the posterior end of the caput gallinaginis, and this, although the instrument should move on in the direction of the canal. This may be avoided by keeping the point of the instrument elevated, and this rule will enable you to avoid another difficulty to which the form of the canal here exposes you. For at each side of the caput gallinaginis, the urethra grows wider and deeper, until you arrive at the neck of the bladder, This, the most posterior part of the canal, appears still more deep in consequence of the neck of the bladder forming a sharp and pretty high ridge, interposed between the canal and the bladder. Should the instrument then be moved on either side of the caput gallinaginis along this deepest part, until it reached the furthest extremity of the canal, you must observe, that it could not be pushed into the bladder even by then raising its point, without forcibly tearing through this ridge at the neck of the bladder. The pain produced by such violence, is extremely severe on the instant, and its consequences may prove very dangerous to a patient of irritable habit, You can then pass the instrument along this last portion of the canal with facility, by depressing the handle so as to elevate the point in such a degree as will enable you to surmount the ridge, formed by the neck of the bladder.

How obviated.

Summary of the obstacles.

On a review of the various obstacles, and the means of surmounting them, you will observe, that you should keep the urethra gently elongated, and should begin to depress the handle, and elevate the point of the instrument before you arrive at the bulb of the urethra, that you should from this point continue to encrease the depression of the handle, and elevation of the point as you advance along the canal, and therefore we might simplify all these directions by saying, that you should begin to describe a semicircle with the instrument, from the time the point approaches to the bulb until it enters into the bladder; and should the instrument at any time be stopped, you must not push it on forcibly, but withdrawing it for a quarter or half an inch, elevate the point, and then attempt to push it onwards.

What position of the patient is most favourable for this operation, or should the form of instrument, or the direction of its course be varied, according to the different posture of the patient?

When you turn to the plates of surgical instruments, it must strike you as an extraordinary fact, that different authors represent their catheters of different forms, and with very different degrees of curvature.

Form of catheter for general use.

The form of the Catheter, which will probably answer best for general use, is that, in which the curvature beginning at the middle of the instrument, describes an arch of a circle of six inches in diameter, and terminates at the point. Some have their Catheters formed with a beak, extending two inches or two inches and a half, between the termination of the curvature and the point of the instrument. But to such a form these objections apply. First, it is more difficult to make it enter, next, that when entered, as the water escapes, the bladder collapsing, falls in upon the point of the catheter, by which, much pain is produced, especially if the handle of the instrument be moved; and even the end of the catheter may be so wrapped about by the lax portion of the bladder, as to prevent any more urine entering through the openings or eyes of the tube. The suggestions of Camper relative to the eyes of the catheter, have been unaccountably overlooked. He proposed that the sides of the instrument should be perforated to a much greater distance from the point, by which means a considerable quantity of urine might still be discharged, after the openings

Objections to catheter with a long beak.

near the point had been closed up, by the bladder falling in on them.

Objections to much curvature.

The Catheter should not be formed with a greater curve than what is requisite to secure its introduction into the bladder, because if much curved, the convexity of the instrument, when introduced, lies towards the inferior part or base of that viscus, while the apex is raised up near to the point from which the urachus ascends, hence a considerable quantity of urine will remain in the bladder, after each introduction of the instrument, and this more particularly, when the bladder is in a state of paralysis.

To draw off then, the entire quantity of urine with an inflexible catheter, we must use one with a slight degree of curvature, and with a short beak—and this we must, before withdrawing it, endeavour to sink into the fundus of the bladder—not by lowering the point only, for by this movement, the handle would be proportionably elevated, and the flow of urine impeded, but we must press the whole of the instrument downwards towards the perinæum; by this means, we sink the anterior part into the fundus, as low as the attachments of the membranous part of the urethra will admit, and remove that obstacle which the elevation of the handle would occasion.

The Gum-elastic Catheter accommodating itself to the form of the bladder, must have a decided preference for drawing off the urine, especially from paralytic bladders.

To draw off urine in paralytic cases.

In cases of Paraplegia, you will find it necessary to make considerable pressure over the pubis, for the purpose of discharging the last portions of urine; for without this expedient, you could not possibly draw off more than two-thirds of the urine with an inflexible instrument.

Such cases admit catheter most easily

By the way, we may observe, that there is a peculiar facility of introducing the catheter in cases of paraplegia, whether arising spontaneously, or excited by injury. And, therefore, the Student should select such cases for his [redacted] attempts on the living body.

Where a very long instrument is to be preferred.

There is a case in which a Catheter of considerable length may be used with advantage—should a quantity of coagulated blood and urine be contained in the bladder of a patient, seized with retention of urine, it is plain, that the blood will lie in the fundus, while the urine occupies the upper part. If in such a case, a catheter of ordinary length were used, it could not pass through the coagulum, whereas if a very long instrument were introduced, it might pass through the blood, and come into the region occupied by the urine. The idea of such an instrument was first suggested to me, by observing in the case of an old gentleman, that the catheter which easily entered the bladder, was always withdrawn plugged up by clots of blood, and yet, in a few minutes, a very large quantity of urine and blood was discharged, by puncturing the bladder above the pubis. If the end of the stilet be surrounded with sponge, so as to fill up the eyes of the instrument, then these cannot be clogged as the catheter is passing through the coagulum ; and the stilet being withdrawn, when the catheter has reached to the collection of urine, this fluid may be evacuated. I have not yet had an opportunity of putting this instrument to the test of experiment.

Position of patient more essential.

Effects of the erect posture.

Effects of horizontal posture with pelvis raised.

It must be admitted that the form of the instrument is not so material to facilitate its introduction, as the recollection of the course of the urethra, and the manner in which it is altered by the different positions of the pelvis. Now as the membranous portion of the urethra is closely connected with the arch of the pubis, it is obvious that it must follow the motions of these bones. Hence a more acute angle is formed between the commencement of the membranous portion of the urethra, and that immediateley anterior to it, whenever the lower edge of the arch of the pubis is turned backwards. Now as the arch is thrown into this position, by the erect posture of the body, it is plain that in this posture a more curved instrument will pass with greater facility, than one of a more straight form. If we use an instrument with the ordinary degree of curvature, we must take care to lower the handle very quickly, as we approach the bulb of the urethra. When the patient is laid horizontally with the pelvis raised, the axis of the pelvis is made almost to coincide with that of the trunk. In this position, the pubis is placed nearly horizontally, and consequently the curve of the urethra is considerably diminished, and the course of this canal is brought as near to a straight line as can be effected by posture. In such a position, the instrument of the ordinary curve should not be turned quickly under the arch, by a sudden depression of the handle. Such a position admits with peculiar facility, the introduction of a more straight instrument. When the patient is placed horizontally, the instrument of the form above described, will pass with the greatest facility, and will require only a moderate and gradual depression of the handle.

ON THE OPERATION OF LITHOTOMY.

IN no other operation in Surgery is a knowledge of anatomy of more essential service to the Surgeon, than in that of Lithotomy. Let us now consider how it will guide him through the different steps of this hazardous operation.

Position of patient. The patient should be laid on a higher table than that ordinarily used for the purpose: as this will allow greater freedom of motion to the Surgeon's hand, and lessen the dangers attendant on some of the most difficult steps in the operation.

Staff. The staff should be of as full a size as the urethra can well admit—should have the handle made rough, which will enable the operator to hold it firmly without much difficulty. Having introduced the staff, now hold the handle of it firmly with the thumb and two forefingers of your left hand; this hold will enable you more sensibly to feel the point of the knife when it first enters the groove of the staff, and (which is of much consequence) will facilitate one of the most difficult and important steps of the operation, the lowering the handle of the staff. The staff thus held, is to be drawn into the arch of the pubis, and then is to be

How to be held.

made prominent in the perinæum. You are not, observe, to hold the handle of the instrument inclined over the right groin of the patient, as is generally directed. Let the staff be perpendicular to the horizon, let it at the same time be drawn up as closely as possible into the arch of the pubis, with its convexity bulging out in the perinæum.

Advantages of thus holding the staff.

If you take care to keep the staff well up into the pubis, you will be secured against its slipping out of the bladder; you will thereby save the rectum from being wounded; and you will avoid all risque of injuring the pudic artery. In a word, you will by attending to this simple direction, render the different steps of the operation, easy and certain.

Posture of Surgeon.

Then kneeling on your left knee, hold the staff in this position; and if you wish to render the right hand more steady, rest your right elbow upon the corresponding knee.

Externa incision.

The staff being thus held, you now feel for the arch of the pubis with the forefinger of the right hand, and a little below this spot you commence your external incision, close to the left side of the raphe, and continue it obliquely, so as to pass midway between the tuberosity of the ischium and the anus. This first incision you will make, not with the point, but by laying the bellying edge of your knife fairly to the perinæum. The integuments will then fly asunder; their natural elasticity being aided by the divarication of the perinæum. In the same line with this, you are to make your

Second incision.

second incision, commencing it half an inch below the upper end of the first; carry it deeply into the perinæum, by it you will divide the transversalis perinei, a few fibres of the sphincter ani, a few fibres also of the transversalis perinei alter (if present), a portion of the levator ani, and a portion of the ligamentous septum of the perineum; taking care that your second shall be nearly equal in length to your first incision. Now enter your knife into the groove of the staff, which you will readily accomplish, if you recollect that your incision is to open the membranous part of the urethra—that this part of the canal passes through the ligamentous septum of the perinæum, at the distance of one inch below the arch of the pubis, and two inches above the tuberosity of the ischium. Attention to these points will direct you to the height in the perinæum, at which you are to enter into the groove of the staff. The depth at which this ligament lies from the surface, may be ascertained by attending to the fullness of the perinæum in each individual, and recollecting that it is attached to the rami of the pubis behind the crura of the penis.

How to fix on the point at which you should enter the groove of the staff.

Why so necessary to be ascertained.

It is the more necessary for you to bear these anatomical facts in your recollection, because the deeper parts of the perinæum do not recede when divided. On the contrary, in corpulent subjects, even the knife is concealed from your view, by the edges of the wound falling together, as soon as it has passed through them.

Therefore holding the knife horizontally, you will push it forwards, and a little towards the right side of your patient, taking care to enter it, not at, but a little below the upper extremity of your external incision. As you perceive the point of the knife grating on the staff, move it from side to side, that you may be sure of its being in the groove, as you might be deceived, were you to rely merely on the rubbing of the knife against the staff; when thus assured that your knife is fairly lodged in the groove, you are to bare it for about a quarter of an inch; this is to be done while the staff continues to be held perpendicular, by moving the knife in the same perpendicular direction. If you do not lay bare so much of the staff before you attempt the division of the prostate gland, you will have to encounter many and most insuperable difficulties, of which we shall speak when we come to describe the division of the prostate—one however, may here be noticed, viz. the resistance given to the knife by the levator ani and the triangular ligament, and by that ligamentous structure which envelopes the membranous part of the urethra. Having thus divided a portion of the membranous part of the urethra, you now proceed to the most difficult part of the operation, viz. the division of the prostate gland and the neck of the bladder on its left side. To effect this, you must alter the position of your instruments; because you know that the direction of the parts now to be divided, is very different from the direction of those through

Divide membranous portion of urethra.

Necessity for this.

Division of prostate

Direction to be given to the instrument.

which you have already cut. For you are now to divide parts which lie behind the arch and symphysis pubis. Wherefore, while you hold your knife horizontally in the lower part of the incision in the urethra, you should now bring the handle of the staff down towards yourself, by making it move on the point of your knife as on a pivott, and at the same time keeping its concavity close up to the arch of the pubis; by this movement, the back of the knife, instead of the point, comes to be lodged in the groove of the staff, and the beak of the latter is directed upwards. You will experience but little difficulty in running the back of your knife along the groove of the staff; if you but recollect the direction into which this last movement has thrown the staff, viz. that it has lodged it immediately behind the arch of the pubis, and therefore, in order to give a corresponding direction to your knife, you must depress the handle of it, lowering your right wrist by throwing back your hand, and then pushing the knife on in the groove, taking especial care that you lower the wrist as you push on the knife.

To run the knife along the groove of staff.

Lateralize the knife.

I should have observed, that before you begin to push your knife on along the groove, you should incline its edge a little towards the left ischium, that you may divide the prostate gland on the left side. You will be sensible that your knife has entered the bladder, by all resistance being removed and by the sudden flow of the urine.

I have said that it is a matter of the greatest importance to the successful, and indeed to the safe performance of this operation, that a considerable portion of the membranous part of the urethra should be divided before the staff is depressed, or that incision commenced, by which the prostate and neck of the bladder are to be divided. For, if you have entered your knife into the urethra, high up in the perinæum; and while the point of the knife is lodged there, should depress the staff, and attempt the division of the prostate, you will have to make it describe a portion of a circle, at the time that it is dividing very resisting parts.

Nothing can be more unsatisfactory to the operator, than the feel, when he attempts the division of the prostate, where he has entered the knife too high in the urethra. He feels as if the parts had not fully yielded, or indeed as if they had not yielded at all; and yet he is conscious that the degree of force which he uses, cannot be continued without the danger of throwing the knife altogether out of the groove of the staff, and plunging it far forwards into the cellular substance, between the bladder and rectum, or of sinking it into the rectum if the point should be at all depressed; so that the knife used in this manner, is productive of all the dangers, and liable to many of those objections which apply to the gorget.—Should the knife, on the contrary, be used in the manner here directed; you will not experience any resistance to the progress of it, except what you may naturally expect from the texture of the parts to be cut; and you have, in the complete absence of all resistance, the most satisfactory proof of the division being fully effected.

You may remark here, that I have advised you to run the back of the knife slightly lateralized, along the groove of the staff, and would wish you to have no other object in view, when performing this movement. For if you accomplish this, the prostate and neck of the bladder must at the same time be divided.

Shape of knife.

The breadth of your knife may, in every instance, be determined by this rule; use one of such breadth, that when lodged in the groove of the staff, it shall be nearly equal to the diameter of the canal of the urethra, and thickness of the prostate gland: a knife of this breadth, and with its cutting edge, not above one inch long, will freely divide all those deep seated parts, which are to be divided, and from its dimensions and form, cannot possibly divide the other parts in the neighbourhood if used the manner here directed.

How to withdraw the knife.

Let us suppose the incision to be made into the neck of the bladder, the knife is now to be withdrawn, by drawing its back a little way along the groove of the staff; and then by lowering the knife as you come out, such of the external parts as have not been sufficiently divided, can now be cut to the necessary extent. Here your knowledge of the wide flat pouch, formed by the rectum at this part, will prevent you from carrying your knife too low down, before you have withdrawn it a little, lest you wound this intestine. Now examine the state of the incision with the index finger of your right hand, and if any bands of undivided cellular substance lie across the wound, break them down with your finger. You now take the forceps with the handles lying on the same plane, and by introducing them, inclined from below upwards and forwards, in the direction of the axis of the pelvis, you push them into the bladder, guiding them by the staff which you still hold, with its handle depressed.

How to avoid wounding the rectum

Introduce the forceps

This step of the operation requires a good deal of care; for, were you to enter the forceps horizontally, you run the risque, or rather you will scarcely avoid the danger of pushing the instrument into the cellular substance between the rectum and bladder, however, complete your division of the neck of the bladder may have been. For the edges of the wounded levator ani contracting, expose this interspace, which now feels as a cavity, in consequence of the retraction of all that cellular substance which lies between these parts. The forceps being introduced, you now withdraw the staff, and standing up, you search for the stone. When you have laid hold on the stone, proceed to extract it, by withdrawing your instrument in the direction of the axis of the pelvis, viz. from above

Cautions in this step of the operation.

Direction in which stone is to be extracted.

downward. If you attempt to withdraw the forceps in a horizontal direction, the stone, if large, must injure the urethra, by pressing it against the pubic ligament, and the arch of the pubis, nor can room be gained in this direction; a slight pressure towards the right side of the patient, may gain some little room; but it is only in the direction abovementioned, that you can gain any material room, and this too, without inducing any contusion of the soft parts.

When you introduce the finger to try for a second stone, be careful not to mistake, for the cavity of the bladder, the space interposed between it and the rectum.

When stone is broken into fragments.

If the stone has been unfortunately broken into small pieces by the forceps, you should endeavour to wash them out, by throwing tepid water into the bladder, with a large syringe, armed with a pipe three or four inches long In performing this, you must also be careful to pass the pipe completely into the bladder, and not to mistake for its cavity, the space between it and the rectum, to which we have so often alluded. Some leave these fragments to be discharged with the urine; but this is objectionable, because although they may have fallen down towards the fundus of the bladder, yet they may be prevented from escaping, by the inflammation and swelling of the lips of the wound; and while those fragments are allowed to remain, the patient suffers to a a considerable degree, that series of distress, for the removal of which, he had submitted to the operation.

This, in point of the number of instruments employed, is the most simple mode of performing the lateral operation for Lithotomy. It is the only mode that should be practised on children under six or eight years of age; because in them the urethra is too small to admit of the introduction of the instruments hereafter to be described, without danger of lacerating this canal. At the same time we must admit, that a more accurate knowledge of the anatomy of the parts, more dexterity in the use of the instruments, and more constant practice in this particular operation, than fall to the lot of Surgeons in general, will be required, to enable the operator to execute it with confidence in himself, and security to his patient.

The lateral operation with Mr. Peile's instruments.

By using two more instruments, this operation can be performed with much greater facility, and with such security, that few accidents have occured during the operation, and still fewer instances of a fatal event, since this mode of operating has been generally adoped by the Surgeons of this City.

Instruments required.

The additional instruments required are, a straight conductor and a knife, which is called the Lithotome. These instruments had originally been invented by Mr. Daunt, an eminent Surgeon in this city; they were improved by the late Mr. Dease, and owe their present perfect form to the ingenuity of Mr. Peile.

The first steps of the operation are the same as those above described. The position of the patient, the mode of holding the staff, of making the external incision, and of laying bare the groove of the staff, correspond in every particular, and therefore it is unnecessary to describe them here. The rules to be observed in the part of the operation to be performed by Mr. Peile's instruments are as follow:— The staff being laid bare, and the surgeon being assured, by moving the knife from side to side, that its point is lodged in the groove, must now bring down the handle of the staff towards himself, making it move on the point of the knife as on a pivot; by this motion the back of the knife is sunk into the groove. You now divide the membranous part of the urethra, and the anterior point of the prostate gland. This you effect by lowering the wrist while you move the knife onwards, taking especial care to make the back of the knife run in the groove, which can only be done by lowering the wrist in proportion as the knife is pushed forwards. The knife you now withdraw, retaining the staff in the present position. Next take up the conductor, catching a firm hold of it, by applying your forefinger along its stem, while the remaining fingers embrace its handle; enter its beak, into the groove of the staff, you ascertain that it is fairly lodged by moving it from side to side; and then lowering the right wrist, run it along the

Directions for this mode of operating.

To introduce the conductor.

staff, taking care to lower the wrist as you push the director forwards, until you have introduced it fairly into the bladder. The urine now flows along the groove of the conductor, assuring you of your success in this step. You now withdraw the staff by moving up the handle towards the abdomen of the patient, at the same time that you are drawing it out of the urethra, the conductor during this time being held immovable. Now rising off your knee, stand between the legs of the patient, and passing the two first fingers of your left hand into the ring, while your thumb is pushed against the handle of the instrument, raise it up as high as possible into the arch of the pubis. In this position you carefully hold it, as by this alone can a wound of the rectum be avoided. Now holding the lithotome between the thumb and two fingers of the right hand, lay its beak on the lower edge of the groove, and pushing it on, until its point has got to the external incision, give it the necessary degree of obliquity or lateralization, as it is termed; by turning the groove of the conductor more or less towards the arch of the pubis. Having determined on the degree of lateralization which you judge necessary, now push on the knife, running it close and parallel to the conductor until it is stopped at the point of the conductor. Withdraw it cautiously, by bringing it back again along the groove. By this means, the division of the prostate is

Withdraw the staff.

How to hold the conductor.

Lithotome how to be used.

effected with the slightest possible force, for the operator is scarcely sensible of any resistance from prostate, and judges that it has been divided—not so much by his having overcome a certain degree of resistance, as by the knife having reached to the end of the groove.

Advantages of this mode of operating

The great advantages of this mode of operating are, that any man who can lay open the urethra on the grooved staff, and has dexterity enough to introduce along it the straight conductor into the bladder, will certainly guard against dividing the rectum, will be enabled to give his knife the required lateralization, which is secured without any further dexterity in making the incision, and therefore, he will be able to avoid in every instance, the division of the internal pudic artery.

How to enlarge the wound in prostate.

Having withdrawn your lithotome, run your finger along the conductor into the bladder, to satisfy yourself of the extent of the incision; but should you find that the prostate is not sufficiently divided, introduce the same lithotome again, now keeping the handle depressed below the stem of the conductor. The division of the gland will be increased in proportion as the handle of the knife is depressed, and therefore you can regulate the movement of the cutting part of the knife, merely by observing the direction of its handle. Now introduce the forceps guided by the conductor, but passed from below upwards, or in a line corresponding with the axis of the pelvis, and conduct the remainder of the operation as already described.

END OF PART FIRST.